

# **Appendix I**

## **Transportation Technical Report**

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*Technical Report*

# **St. Elizabeths East Transportation Network: Environmental Assessment Traffic and Transportation**

Prepared for  
**District Department of Transportation**

March 2012

**CH2MHILL**



# **1. Introduction and Background**

This technical report summarizes transportation related impacts associated with the proposed transportation network improvements to St. Elizabeth's East Campus. Impacts to vehicular traffic, trucks, parking, pedestrians, bicyclists, and transit service are discussed.

## **1.1 Land Use Changes Affecting the Project Area**

The Office of the Deputy Mayor for Planning and Economic Development (DMPED) along with the District Office of Planning (DCOP) are leading efforts to redevelop East Campus into a mixed-use community with residential, office, hotel, and retail uses. Along with the redevelopment of East Campus, several significant land use changes that will affect future travel patterns near East Campus. The Department of Homeland Security (DHS) plans to consolidate its headquarters and relocate to St. Elizabeth's West Campus. FEMA plans to relocate its headquarters to a site directly north of the East Campus redevelopment (East Campus North Parcel). Both projects are expected to be significant drivers of future traffic growth.

## **1.2 Transportation Improvements Affecting the Project Area**

Several transportation improvements are also expected to affect future travel patterns including:

- Widening the existing four-lane Martin Luther King, Jr. Ave. to include two travel lanes in each direction along with a center two-way left turn lane, and upgraded pedestrian facilities.
- Extension of 13th St. between Mississippi Ave. and Valley Ave.
- Relocation of Pecan St. intersection with Martin Luther King, Jr. Ave. approximately 200 feet north and installation of new traffic signal.
- Changes to the interchange between Malcolm X Ave. at I-295 (Anacostia Freeway)
- Improvements to the Firth Sterling Ave. and West Campus Road intersection
- 11th Street Bridge replacement.
- South Capitol Street Final Environmental Impact Statement, Preferred Alternative. Major elements south and east of the Anacostia River include:
  - Replace existing Frederick Douglass Memorial Bridge on new location.
  - Construct traffic circle at eastern approach to the new Frederick Douglass Memorial Bridge to connect South Capitol Street, Suitland Parkway and Howard Road.
  - Replace existing Suitland Parkway/I-295 interchange.
  - Reconstruct the I-295 bridge over South Capitol Street.
  - Widen the I-295 bridge over Howard Road.
  - Widen the Martin Luther King, Jr. Avenue overpass at Suitland Parkway to accommodate a new multi-use trail.

- Construct a single-point center ramp interchange to create new access between Suitland Parkway and Martin Luther King, Jr. Avenue.
- Reconstruct pedestrian over-pass over Suitland Parkway between Sheridan Road and Barry Farms.
- The DC Streetcar System Anacostia Initial Line Segment

All alternatives discussed in the following section assume these land use changes and transportation improvements would occur.

### **1.3 Alternatives**

The existing roads within East Campus were designed to meet the specific needs of the original hospital. This meant providing access for service vehicles and employees while maintaining isolation between the campus and surrounding areas. The redevelopment of East Campus will require a transportation network that serves much different needs and requirements. The Council of the District of Columbia approved the *Saint Elizabeth's East Redevelopment Framework Plan* to establish principles and guidelines for redeveloping the campus. The document emphasizes a need for transportation improvements that will enhance internal and external connectivity; open the campus for public use; and improve multi-modal transportation within the site (DCOP 2008). Two proposed alternatives have been developed to provide a multi-modal transportation network for St. Elizabeth's East Campus. This report includes analysis of these two alternatives along with a No-Build alternative. Impacts are assessed for the design year 2035.

#### **No-Build Alternative**

Under the No-Build Alternative, the existing transportation network would be maintained and repaired. This would include any necessary reconstruction of the existing roads in their current configuration. Reconstruction would not include widening of the paved surface or sidewalks, or any other changes to the current cross-section. Under the No-Build Alternative, East Campus would essentially maintain the same internal network as exists today.

Existing roadway widths currently vary between 20 and 29 feet. Cypress St. is an exception with a roadway width of 39 feet close to its intersection with Martin Luther King Jr. Ave. In many cases existing roadway widths would not be able to accommodate two travel lanes, on-street parking, separate bicycle facilities, and/or sufficient turning radii for transit vehicles. Many of the streets would be one-way.

#### **Build Alternatives**

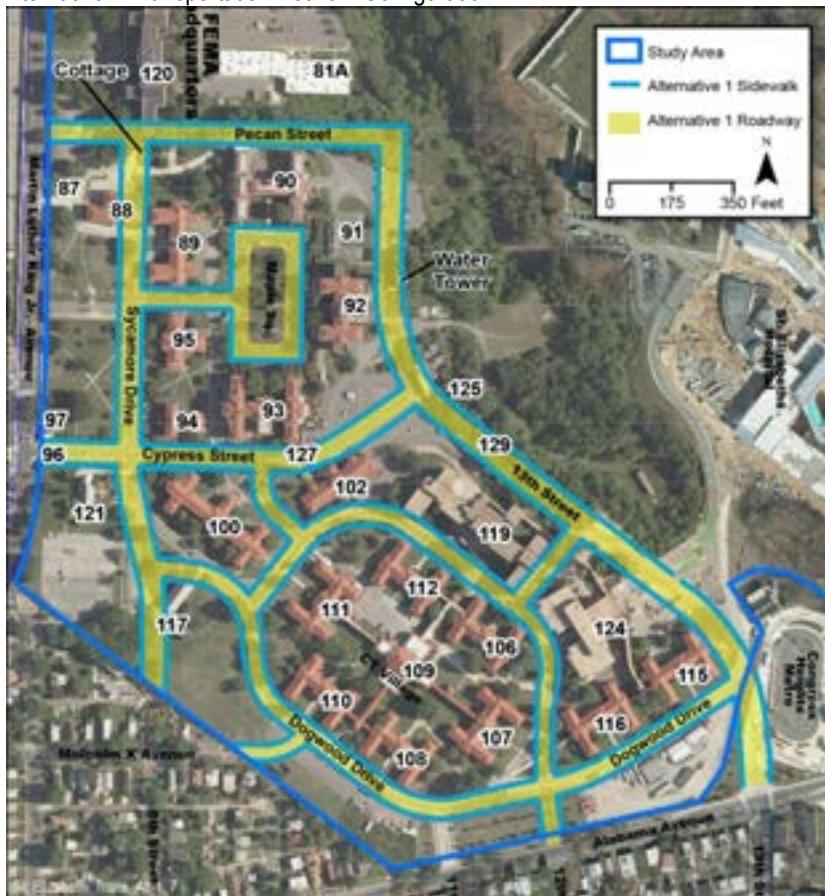
Two alternatives have been developed to make the site accessible to through traffic and provide additional access points to the site. Both alternatives provide new accommodations for bicyclists and pedestrians. Both alternatives provide essentially similar internal and external connectivity, although roadway alignments vary slightly between the two. The following improvements are provided in both alternatives:

- Intersection of 13<sup>th</sup> St. and Alabama Ave. at the Congress Heights Metro Station is reconfigured to provide access into East Campus.

- 13th St. along the eastern boundary and Sycamore St. near the western boundary is extended to provide additional north-south connections through the site.
- Pecan St. and Cypress St., which intersect with Martin Luther King Jr. Ave., are extended to provide east-west connections between 13th St. and Martin Luther King Jr. Ave.
- Existing site access at 11th Pl. and Alabama Ave. will be replaced by a new access point at 12th St. and Alabama Ave. This location provides better connectivity with Oak St. within East Campus.
- Signal at 11<sup>th</sup> Pl. and Alabama Ave. is removed. A new signal is installed at 12<sup>th</sup> St. and Alabama Ave.
- New access point into East Campus from 8<sup>th</sup> St.
- New access point into East Campus from Malcolm X Ave.
- Access to the new St. Elizabeth's Hospital is provided via a reconfigured driveway connection to 13<sup>th</sup> St.
- The Congress Heights Metro Station bus circulation and kiss and ride areas are reconfigured to connect via a new intersection on 13<sup>th</sup> St.

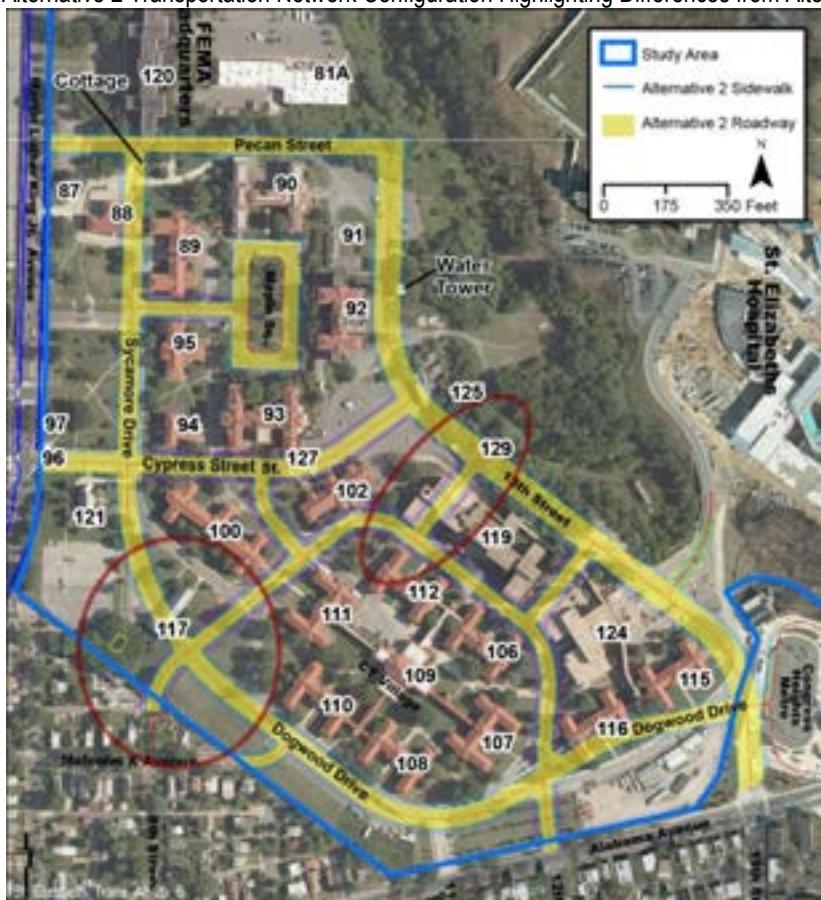
Figures 1 and 2 illustrate Alternative 1 and Alternative 2 respectively.

**FIGURE 1**  
Alternative 1 Transportation Network Configuration



**FIGURE 2**

Alternative 2 Transportation Network Configuration Highlighting Differences from Alternative 1



## 2. Discussion of Impacts

### 2.1 Vehicular Traffic

Impacts from vehicular traffic were assessed by developing peak hour traffic forecasts based off the Washington, DC region's adopted travel demand model - *National Capital Region Transportation Planning Board, TPB Travel Forecasting Model, Version 2.2*. The model uses the latest approved regional land use forecast - *Metropolitan Washington Council of Governments Round 8.0 Cooperative Land Use Forecasts*.

Several modifications to the travel demand model were made in order to better reflect the transportation network and land use concentration in the vicinity of the East Campus. This included adding additional network links to the model to better reflect the local Street network and splitting traffic analysis zones (TAZs) to better reflect the concentration of development. Manual post-processing of travel demand modeling output was performed so that peak hour forecasts reflect travel patterns observed from field collected intersection traffic counts. Manual revisions to the model output were also made so that traffic forecasts reflect the implementation of travel demand management (TDM) strategies for the proposed redevelopment of East Campus by DCOP and DMPED.

Impacts are assessed for the design year 2035. *Highway Capacity Manual* intersection level-of-service (LOS) and average intersection delay per vehicle (seconds/vehicle) were obtained by using *Synchro Version 7* traffic analysis software. Microsimulation was also performed for all scenarios using *VISSIM Version 5.1*. The following discussion reports LOS and intersection delay obtained from microsimulation.

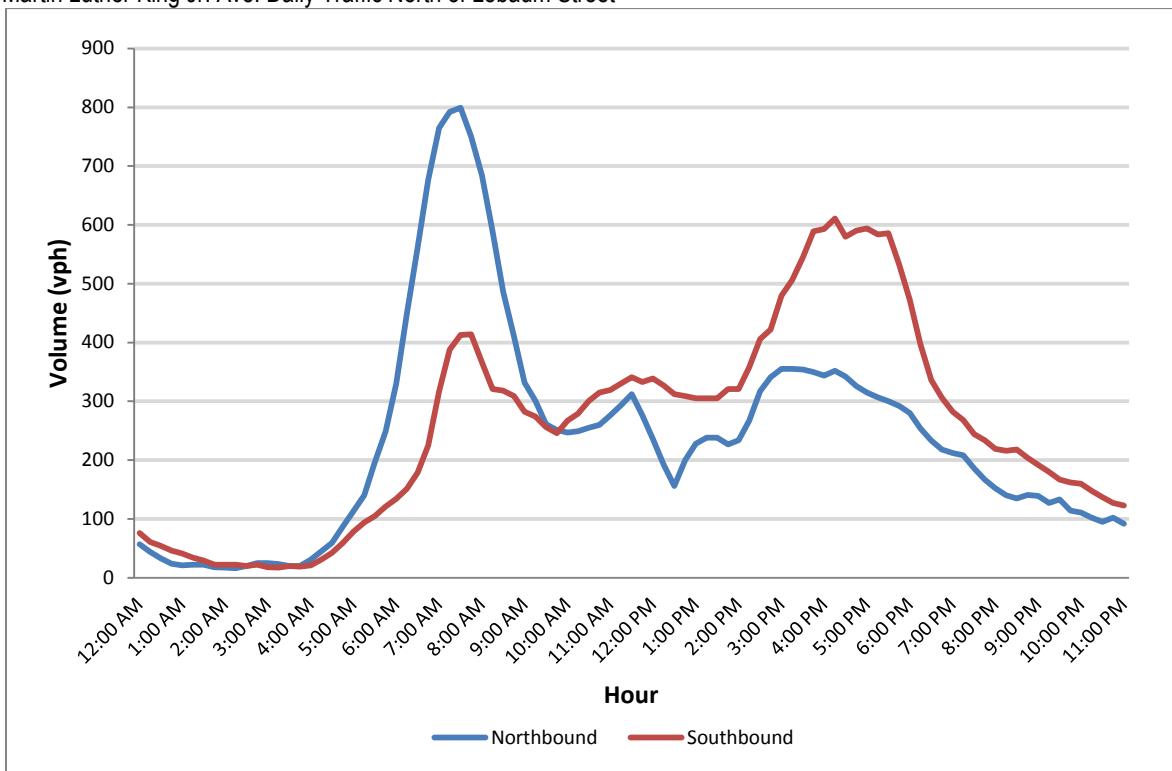
#### Existing Conditions

Martin Luther King Jr. Ave. provides the primary north-south connections through the East Campus vicinity. Alabama Ave. and Malcolm X Ave. provide the primary east-west connections. All three roadways are classified as minor urban arterials. Figures 3, 4, and 5 illustrate daily traffic diurnals for Martin Luther King Jr. Ave., Malcolm X Ave., and Alabama Ave. respectively. Average daily traffic along Martin Luther King Jr. Ave. and Alabama Ave. is as follows:

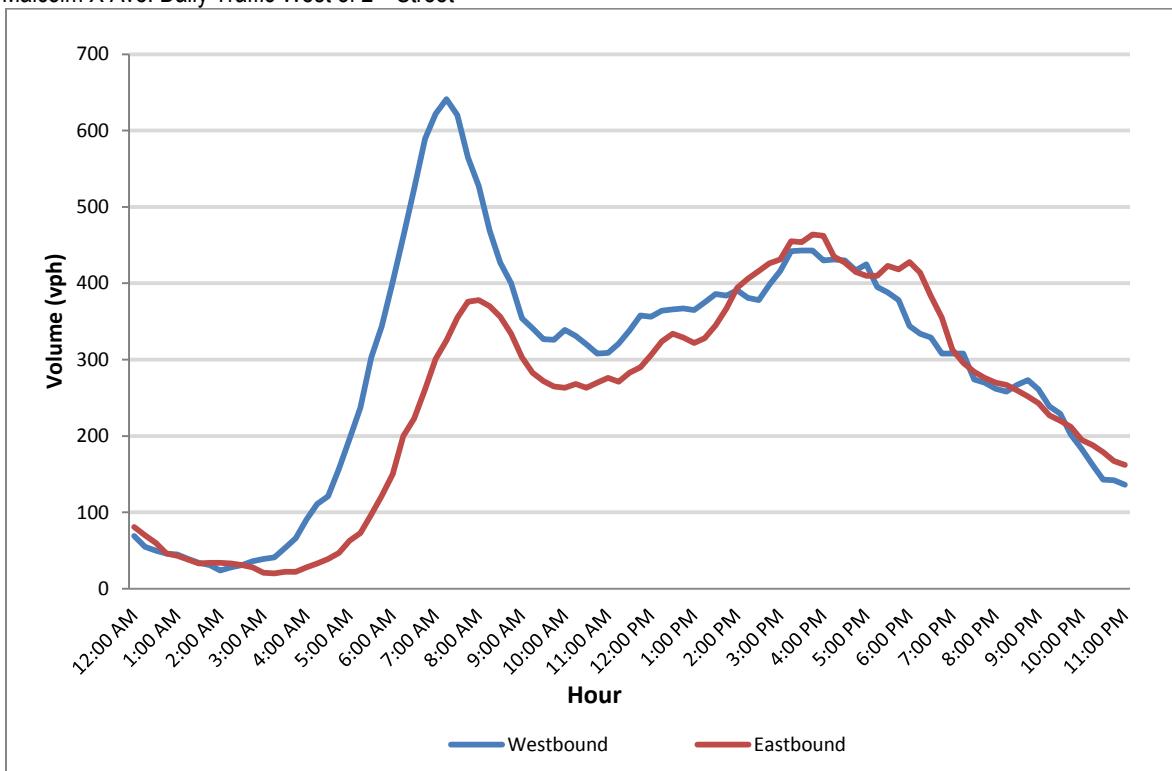
- Martin Luther King Jr. Ave.  
*Northbound north of Lebaum St.* – 5,590  
*Southbound north of Lebaum St.* – 6,020
- Alabama Ave.  
*Eastbound east of 13<sup>th</sup> St.* – 6,420  
*Westbound east of 13<sup>th</sup> St.* – 6,200

The AM peak traffic period is generally between 7 AM and 9 AM while the PM peak traffic period is between 4 PM and 6 PM.

**FIGURE 3**  
Martin Luther King Jr. Ave. Daily Traffic North of Lebaum Street



**FIGURE 4**  
Malcolm X Ave. Daily Traffic West of 2<sup>nd</sup> Street



**FIGURE 5**  
Alabama Ave. Daily Traffic East of 13<sup>th</sup> St.

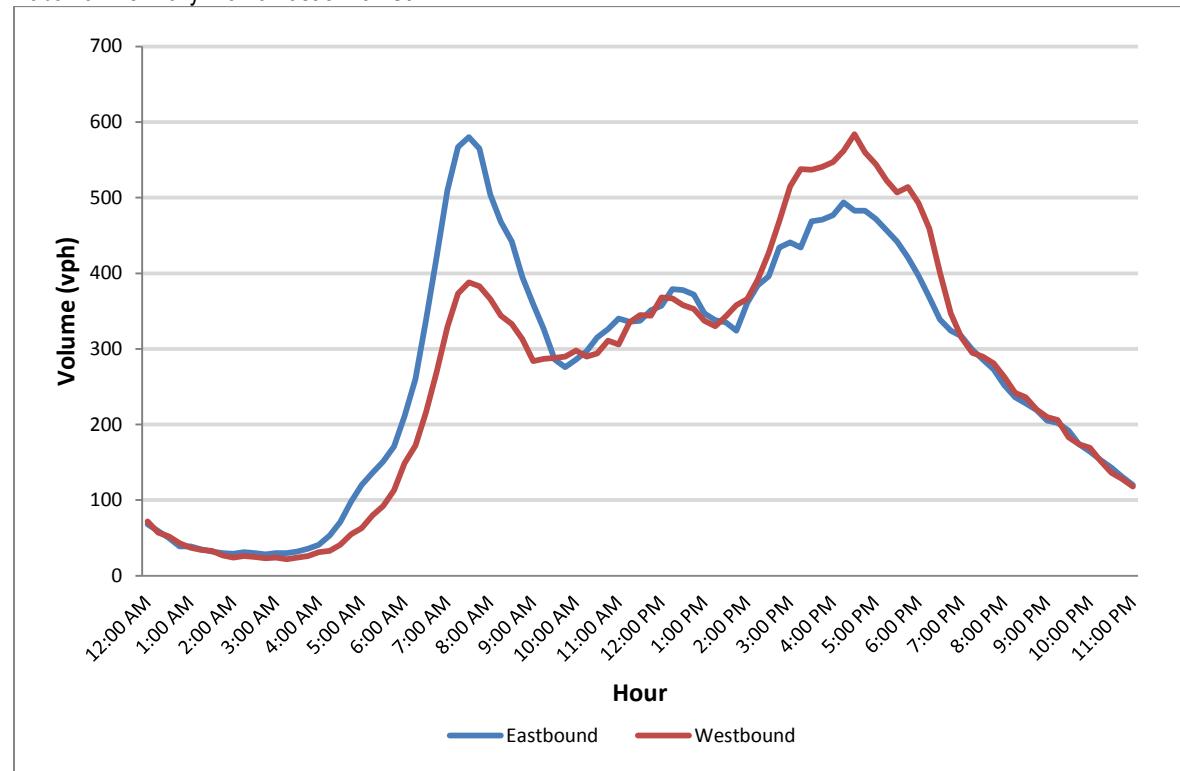


Figure 6 illustrates existing AM and PM peak hour traffic volumes. During the AM peak hour, traffic in the vicinity of East Campus generally flows northwest from surrounding residential areas to downtown Washington, DC. Vehicles heading north from points south and east must travel west past the campus before continuing north. Alabama Ave. carries a significant portion of westbound traffic to continue north via Martin Luther King Jr. Ave. Located farther south of East Campus, Mississippi Ave. follows a parallel east-west route and carries additional traffic to continue north via 4<sup>th</sup> St. and Martin Luther King Jr. Ave.

During the PM peak hour, traffic in the vicinity of East Campus generally flows southeast from downtown Washington DC to nearby residential areas. Vehicles headed to points south and east must travel around East Campus.

### Existing LOS

Approximately half of the intersections within the study area operate at LOS C or better during the AM and PM peak hours, as shown in Figure 7. Intersections operating at a poor or failing LOS are primarily located within the residential area directly southwest of East Campus due to high cut-through volumes that exceed available capacity. The following intersections operate at LOS D or worse under existing conditions:

- Martin Luther King Jr. Ave. / Lebaum St.  
AM Peak – LOS F  
PM Peak – LOS D

- Martin Luther King Jr. Ave. SE / Malcolm X Ave.  
*AM Peak – LOS D*  
*PM Peak – LOS E*
- Martin Luther King Jr. Ave. / Raleigh Pl.  
*AM Peak – LOS E*
- Martin Luther King Jr. Ave. / 4<sup>th</sup> St.  
*AM Peak – LOS E*
- Alabama Ave/8<sup>th</sup> St.  
*AM Peak – LOS D*  
*PM Peak – LOS F*
- Malcolm X Ave. / 7<sup>th</sup> St.  
*AM Peak – LOS E*  
*PM Peak – LOS D*

Both 7<sup>th</sup> St. and 8<sup>th</sup> St. offer cut-through options for vehicles traveling between Alabama Ave., Martin Luther King Jr. Ave., and Malcolm X Ave. 7<sup>th</sup> St. runs north-south, connecting Alabama Ave. with Malcolm X Ave. and Martin Luther King Jr. Ave. to the north. During the AM peak hour, high cut-through volume on 7<sup>th</sup> St. contributes to poor LOS conditions and long delays at the stop-controlled intersection of Martin Luther King Jr. Ave. / Lebaum St. Located east of 7<sup>th</sup> St., 8<sup>th</sup> St. runs a parallel north-south route connecting Malcolm X Ave. with Alabama Ave. During the PM peak hour, 8<sup>th</sup> St. attracts significant southbound volume that results in poor LOS and long delays at the intersection with Alabama Ave.

Intersections located along Martin Luther King Jr. Ave. near the Martin Luther King Jr. Ave. / Alabama Ave. intersection also exhibit long delays and poor LOS under existing conditions. Vehicles traveling southbound on Martin Luther King Jr. Ave. cannot directly access eastbound Alabama Ave. Instead, southbound vehicles must turn left on Randle Pl. to reach Alabama Ave. or travel east on Malcolm X Ave. through the residential area directly southwest of East Campus to meet with a north-south route that intersects with Alabama Ave. Trucks are restricted from entering the residential area which limits available option for trucks to connect between Alabama Ave. and Martin Luther King Jr. Ave.

Due to high left-turn volume, the Randle Pl. /Martin Luther King Jr. Ave. intersection operates at poor LOS during the PM peak hour. Similarly, the Martin Luther King Jr. Ave. / Malcolm X Ave. intersection operates at poor LOS during the PM peak due to a high number of southbound left-turning vehicles on Martin Luther King Jr. Ave. and eastbound through vehicles on Malcolm X Ave. opting to travel through the residential area to access Alabama Ave.

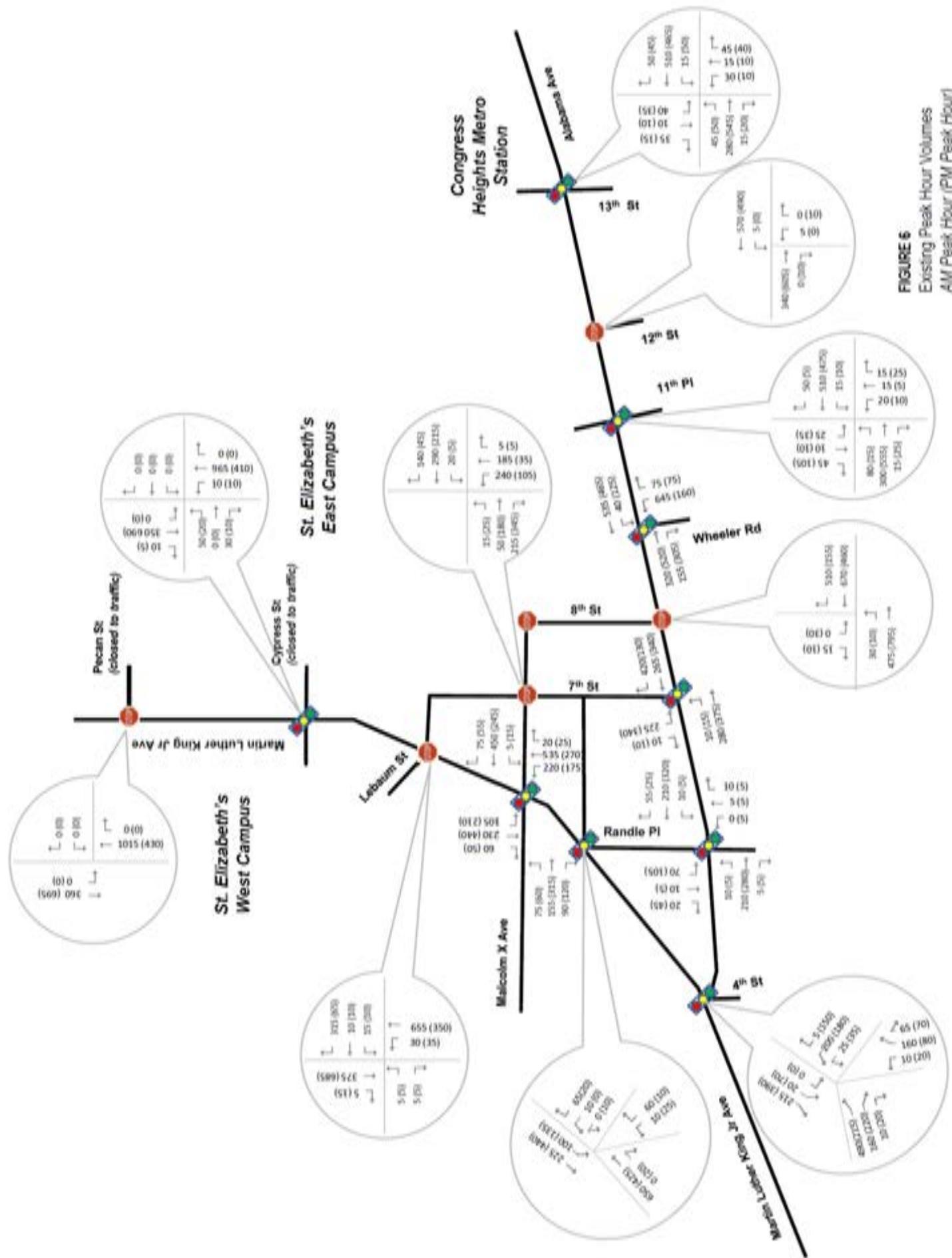
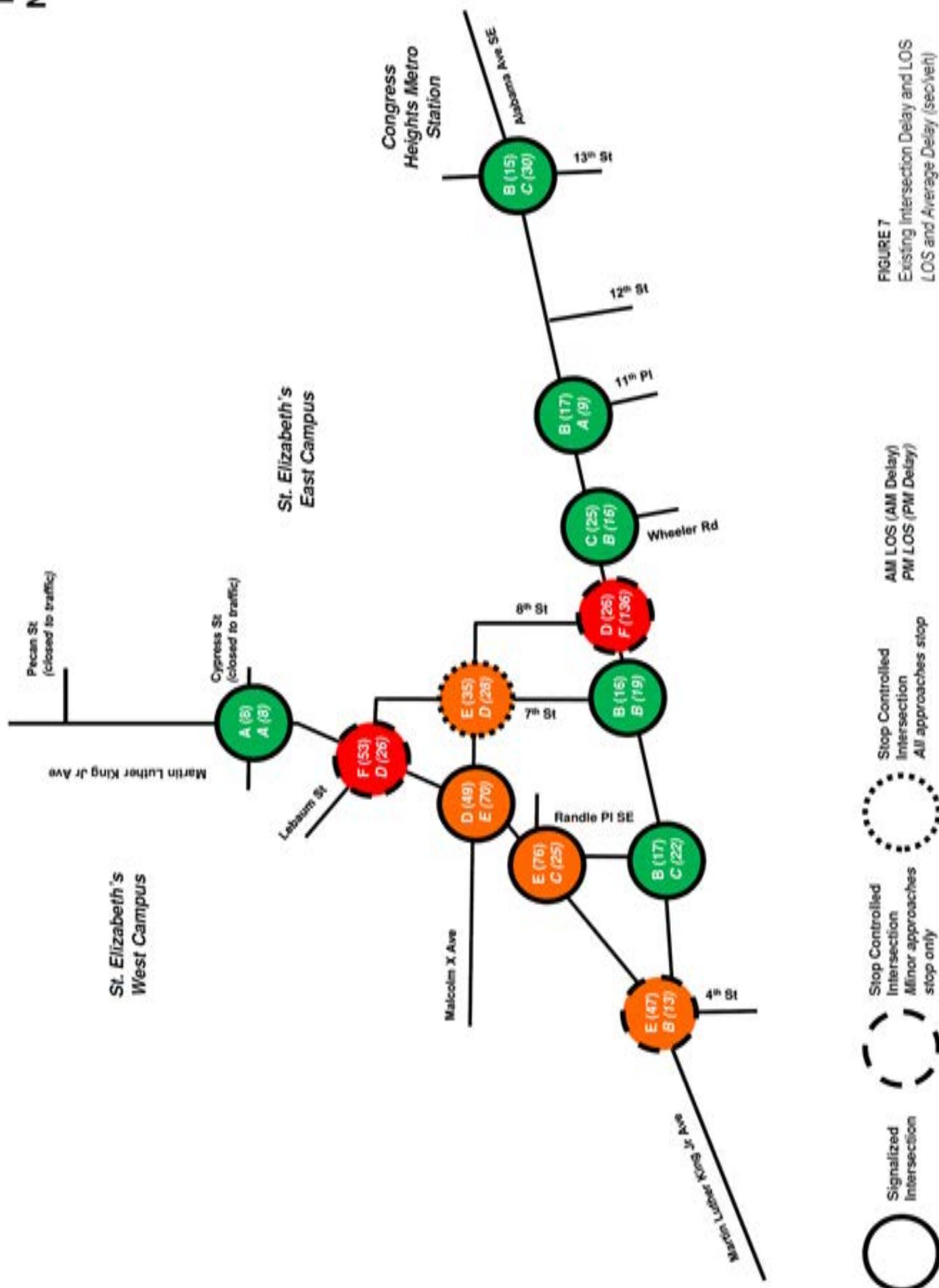


FIGURE 6  
Existing Peak Hour Volumes  
AM Peak Hour (PM Peak Hour)

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## No-Build Alternative

Figure 8 shows AM and PM peak hour volumes for the No-Build Alternative. Similar traffic patterns within the study area as existing are expected but with higher demand volumes resulting from DHS's relocation to West Campus and the redevelopment of East Campus. During the AM peak hour, northbound volume on Martin Luther King Jr. Ave. and westbound volume on Malcolm X Ave. is expected to grow 50 percent by the year 2035, while northbound volume on 4<sup>th</sup> St. is expected to increase by more than 75 percent. During the PM peak, southbound volume on Martin Luther King Jr. Ave. through the study area is expected to nearly double by the year 2035.

Average daily traffic along Martin Luther King Jr. Ave. and Alabama Ave. is estimated as follows:

- Martin Luther King Jr. Ave.  
*Northbound north of Lebaum St. – 10,200*  
*Southbound north of Lebaum St. – 11,600*
- Alabama Ave.  
*Eastbound east of 13<sup>th</sup> St. – 5,700*  
*Westbound east of 13<sup>th</sup> St. – 6,100*

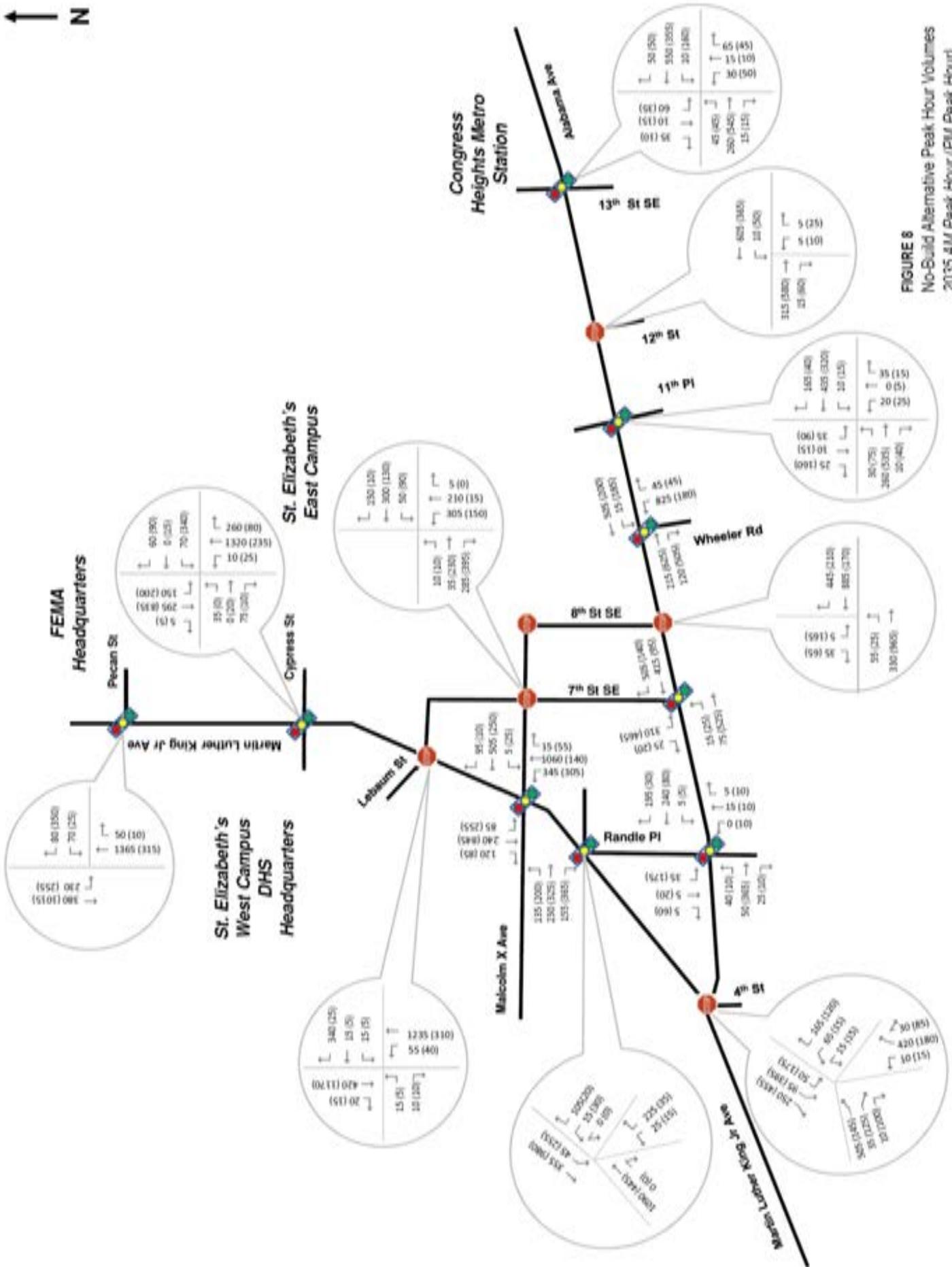
## No-Build Alternative LOS

Figure 9 shows AM and PM peak hour intersection LOS under No-Build conditions. Most intersections within the study area would operate at LOS D or worse. The worst performing intersections are located along Martin Luther King Jr. Ave. and also within the residential area southwest of campus. The following intersections operate at an LOS D or worse under the 2035 No-Build alternative:

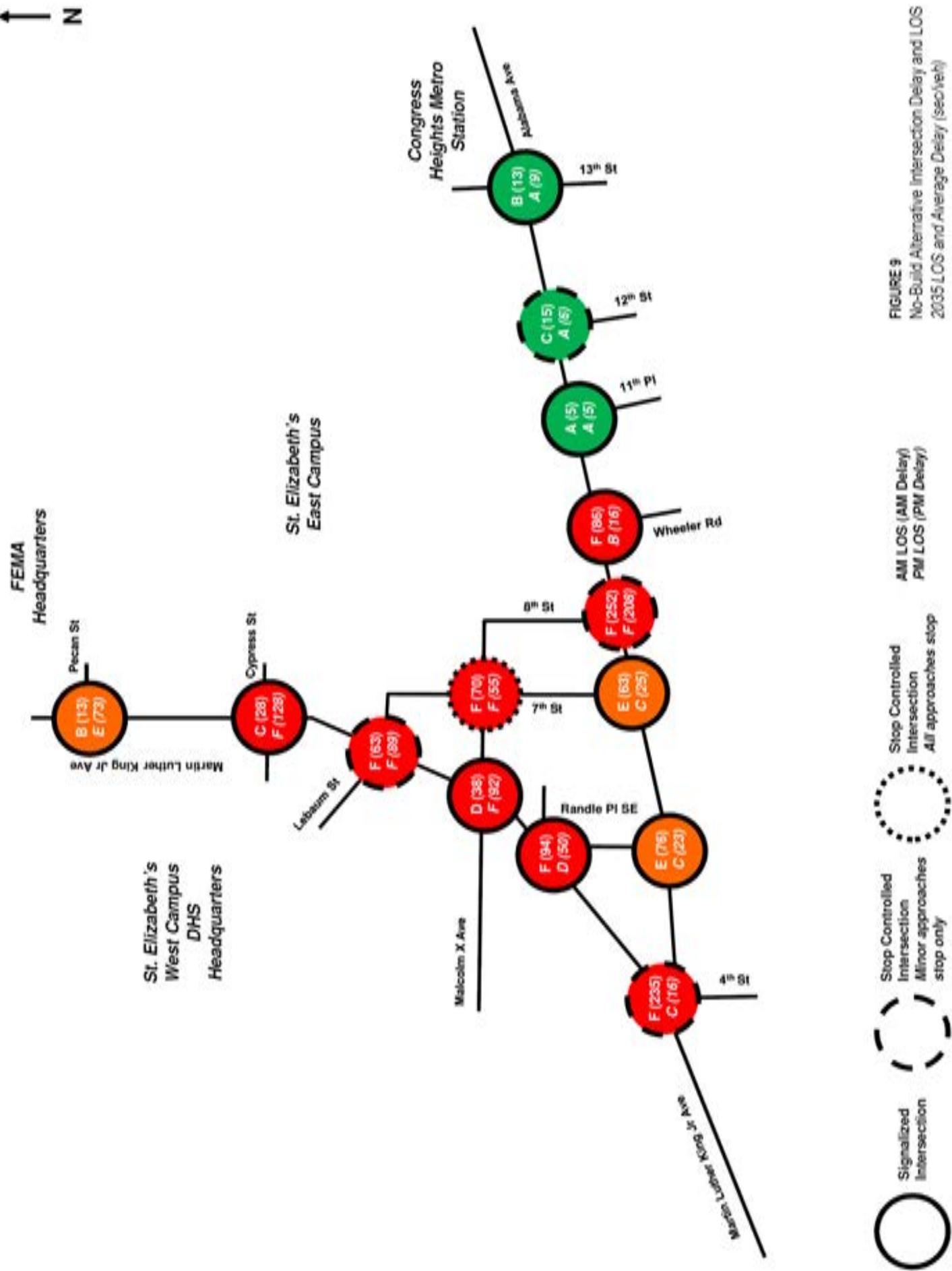
- Martin Luther King Jr. Ave. / Pecan St.  
*PM Peak – LOS E*
- Martin Luther King Jr. Ave. / Cypress St.  
*PM Peak – LOS F*
- Martin Luther King Jr. Ave. / Lebaum St.  
*AM Peak - LOS F*  
*PM Peak - LOS F*
- Martin Luther King Jr. Ave. / Malcolm X Ave.  
*AM Peak – LOS D*  
*PM Peak - LOS F*
- Martin Luther King Jr. Ave. / Randle Pl.  
*AM Peak - LOS F*  
*PM Peak – LOS D*
- Martin Luther King Jr. Ave. / 4<sup>th</sup> St.  
*AM Peak - LOS F*
- Alabama Ave. / Randle Pl.  
*AM Peak – LOS E*

- Alabama Ave. / 7<sup>th</sup> St.  
*AM Peak – LOS E*
- Alabama Ave. / 8<sup>th</sup> St.  
*AM Peak - LOS F*  
*PM Peak – LOS F*
- Alabama Ave. / Wheeler Rd.  
*AM Peak – LOS F*
- Malcolm X Ave. / 7<sup>th</sup> St.  
*AM Peak – LOS F*  
*PM Peak – LOS F*

Many of these intersections operate at poor or failing LOS under existing conditions as well, but now experience longer delays and worsening LOS under the No-Build Alternative due to increases in volumes. 7<sup>th</sup> St. and 8<sup>th</sup> St. continue to serve as cut-through routes under the No-Build Alternative. For both peak hours, higher volumes on 7<sup>th</sup> St. will contribute to a decline in operations and LOS at the intersections of 7<sup>th</sup> St. / Malcolm X Ave. and Martin Luther King Jr. Ave. / Lebaum St. During the PM peak hour, an increase in southbound volume on 8<sup>th</sup> St. will result in added delay from existing conditions.



**FIGURE 8**  
No-Build Alternative Peak Hour Volumes  
2035 AM Peak Hour (FM Peak Hour)



## Build Alternatives

Under both Alternative 1 and Alternative 2, traffic patterns will change as the proposed new roadways in East Campus provide more direct routes for commuters. Through traffic once concentrated within the residential neighborhood directly southwest of East Campus will be redistributed on new routes through the campus, resulting in reduced demand at intersections along Martin Luther King Jr. Ave. near its intersection with Alabama Ave. Malcolm X Ave., 7<sup>th</sup> St., 8<sup>th</sup> St. and Lebaum St. would also see decreases in cut-through traffic. During the AM peak hour, vehicles travelling west on Alabama Ave. will be able to use 13<sup>th</sup> St. or Sycamore St. to access Martin Luther King Jr. Ave. rather than cutting through the residential area directly southwest of East Campus. Similarly, vehicles travelling south during the PM peak hour can take alternate routes through East Campus to access Alabama Ave., Mississippi Ave., and residential areas to the south and east, rather than continuing farther south to Malcolm X Ave. or the Martin Luther King Jr. Ave. / Alabama Ave. intersection. Figure 10 illustrates AM and PM peak hour volumes for Alternative 1 and Alternative 2. Both alternatives provide very similar connectivity; therefore forecast volumes and intersection LOS are considered the same between alternatives in the following discussion.

Average daily traffic under the Build Alternatives is estimated as follows:

- Martin Luther King Jr. Ave.  
*Northbound north of Lebaum St. – 7,500*  
*Southbound north of Lebaum St. – 8,100*
- Alabama Ave.  
*Eastbound east of 13<sup>th</sup> St. – 7,000*  
*Westbound east of 13<sup>th</sup> St. – 6,800*

## Alternative 1 and Alternative 2 LOS

Under both alternatives, most intersections within the study area operate at LOS C or better for both peak periods as shown in Figure 11. Intersections located within the residential area southwest of campus operate with improved LOS and less delay than in the No-Build Alternative due to an overall reduction in cut-through volume. The following intersections experience shorter delays and improved LOS under the Build Alternatives than the No-Build alternative:

- Martin Luther King Jr. Ave. / Pecan St.  
*PM Peak – From LOS E in No Build to LOS A in Build Alternatives*
- Martin Luther King Jr. Ave. / Cypress St.  
*PM Peak – From LOS F in to LOS A*
- Martin Luther King Jr. Ave. / Lebaum St.  
*AM Peak – From LOS F to LOS D*  
*PM Peak – From LOS F to LOS C*
- Martin Luther King Jr. Ave. / Malcolm X Ave.  
*AM Peak – Remains LOS D with higher delay*  
*PM Peak – From LOS F to LOS D*

- Martin Luther King Jr. Ave. / Randle Pl.  
*AM Peak – From LOS F to LOS E*  
*PM Peak – From LOS D to LOS B*
- Martin Luther King Jr. Ave. / 4<sup>th</sup> St.  
*AM Peak – Remains LOS F with lower delay*
- Alabama Ave. / Randle Pl.  
*AM Peak – From LOS E to LOS B*
- Alabama Ave. / 7<sup>th</sup> St.  
*AM Peak – From LOS E to LOS C*
- Alabama Ave. / 8<sup>th</sup> St.  
*AM Peak – From LOS F to LOS B*  
*PM Peak – From LOS F to LOS D*
- Alabama Ave. / Wheeler Rd.  
*AM Peak – From LOS F to LOS to LOS C*
- Malcolm X Ave. / 7<sup>th</sup> St.  
*AM Peak – From LOS F to LOS E*  
*PM Peak – From LOS F to LOS C*

In the Build Alternatives, vehicles that would have used 7<sup>th</sup> St. under the No-Build Alternative to connect between Alabama Ave. and Martin Luther King Jr. Ave. can now use Sycamore St. and 13<sup>th</sup> St. farther east, resulting in delay reductions at the intersections of 7<sup>th</sup> St. / Malcolm X Ave. and Martin Luther King Jr. Ave. / Lebaum St. for both peak hours. New route choices through campus result in a reduction in through volume on Alabama Ave. near the intersection with Martin Luther King Jr. Ave. and improved operations at the Alabama Ave. / 8<sup>th</sup> St. intersection.

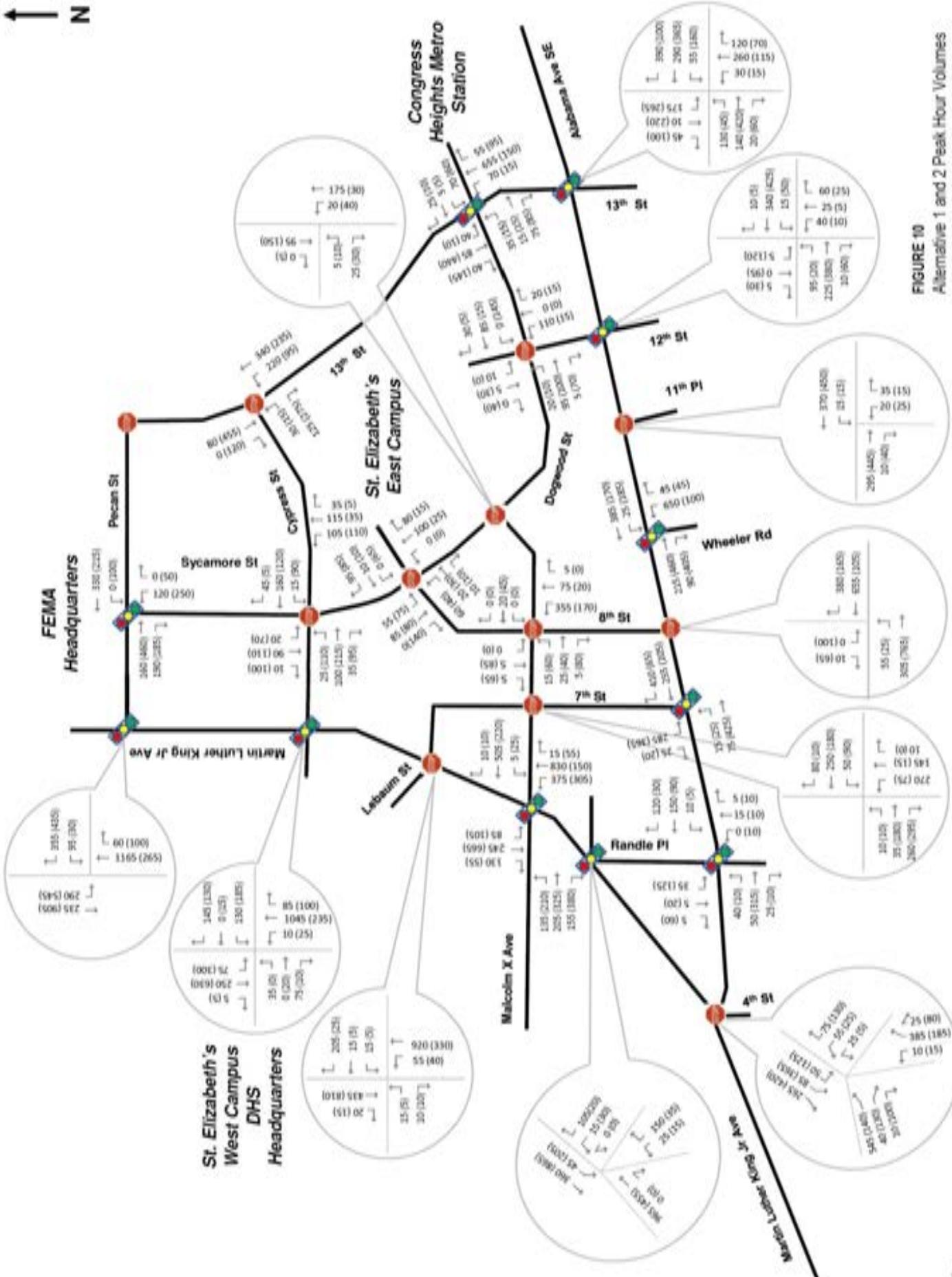


FIGURE 10  
Alternative 1 and 2 Peak Hour Volumes  
2035 AM Peak Hour (PM Peak Hour)

Note: Alternatives 1 and 2 provide similar connectivity with the difference in internal capacity alignments and alternate connections. This figure depicts the Alternative 2 roadway alignment but extraction volumes are applicable to both alternatives.

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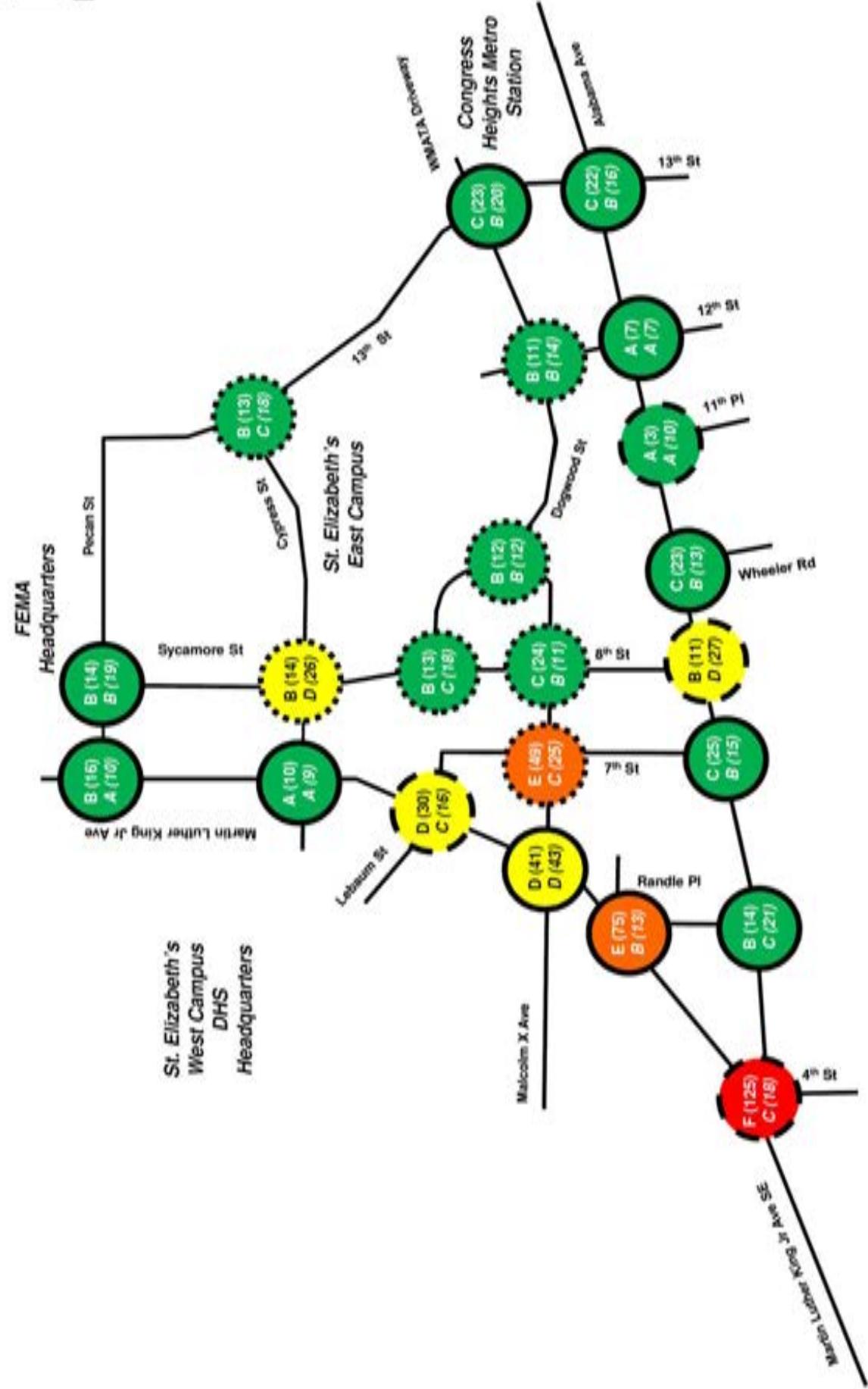


FIGURE 11  
Alternative 1 and 2 Intersection Delay and LOS  
2035 LOS and Average Delay (second)

Note:  
Alternatives 1 and 2 provide similar connectivity with the difference in minimal roadway alignments and minor connections. This figure depicts the Alternative 2 roadway alignment but intersection LOS are applicable to both alternatives.



## 2.2 Parking

### No-Build Alternative

As stated previously, the existing roadway widths at East Campus vary between 20 and 29 feet. On-street parking could not be accommodated with these widths if two travel lanes are also to be maintained. Demand for on-street parking in the vicinity of the site will increase in the future as a result of the redevelopment at East Campus, which will draw employees, residents, and visitors to the area. Under the No-Build alternative, this additional demand for on-street parking would have to be met by existing streets. Nearby, on-street parking is available along Alabama Ave. and Martin Luther King Jr. Ave. in the off-peak direction. On-street parking is also available within the residential area southwest of East Campus on 7<sup>th</sup> St., 8<sup>th</sup> St., 9<sup>th</sup> St., Lebaum St., and Malcolm X Ave.

### Build Alternatives

Alternative 1 and Alternative 2 both propose on-street parking on new roadways to better accommodate future demand. Both build alternatives provide approximately 750 additional on-street parking spaces throughout East Campus. Most of the additional parking will be along Dogwood St., Cypress St., Sycamore St., and Oak St. The provision of on-street parking will minimize the need for vehicles to use existing on-street parking in the neighboring residential areas surrounding East Campus.

## 2.3 Trucks

### No-Build Alternative

Based on field collected traffic counts, trucks can make up between five and 14 percent of total traffic. The highest truck volumes occur during the AM peak period, where trucks comprise 14 percent of traffic along northbound Martin Luther King Jr. Ave. and westbound Alabama Ave. There are restrictions in place for through truck traffic within the residential neighborhood directly adjacent to the southwest border of East Campus. The streets with restrictions for through truck traffic include:

- 7<sup>th</sup> St. north of Alabama Ave.
- 8<sup>th</sup> St. north of Alabama Ave.
- Lebaum St. east of Martin Luther King Jr. Ave.
- Malcolm X Ave. east of Martin Luther King Jr. Ave.

For the design year 2035, trucks are expected to comprise approximately the same percentage of total traffic as today. This will result in truck volumes between 100 and 200 vehicles on Alabama Ave. and Martin Luther King Jr. Ave. Truck traffic from the redevelopment of East Campus is expected to between 20 and 35 vehicles during the peak hours. Truck restrictions that are currently in place are expected to continue resulting in limited connections between Alabama Ave. and Martin Luther King Jr. Ave. – both roads with high truck volume percentages.

### Build Alternatives

Both Alternative 1 and Alternative 2 provide alternative routes for through truck traffic. Trucks can use 13<sup>th</sup> and Sycamore St. to connect between Alabama and Martin Luther King Jr. Ave.

New street connections through East Campus will result in fewer trucks on Alabama Ave. west of 13<sup>th</sup> St. and Martin Luther King Jr. Ave. south of Pecan St. Truck restrictions noted in the No-Build Alternative would remain in place for both Alternative 1 and Alternative 2.

## 2.4 Pedestrians

### No-Build Alternative

Figure 12 illustrates the existing sidewalk network inside East Campus as well as in the surrounding neighborhoods. Under the No-Build Alternative, the pedestrian network would be essentially the same as illustrated in Figure 14. Most streets in the vicinity of the St. Elizabeth's East Campus have sidewalks on both sides, and generally provide acceptable conditions for pedestrians. Pedestrian crosswalks are provided at most intersections. Alabama Ave., Malcolm X Ave., and Martin Luther King Jr. Ave., all have sidewalks on both sides of the street. The sidewalks on both Alabama Ave. and Malcolm X Ave. are separated by a vegetation buffer and a lane of parked vehicles, improving conditions for pedestrians. Martin Luther King Jr Ave., on the other hand, has sidewalks which abut the travel lane in some places and does not have on-street parking. Walking along Martin Luther King Jr Ave. can be uncomfortable for pedestrians. Under the No-Build Alternative, existing sidewalks within East Campus would be maintained.

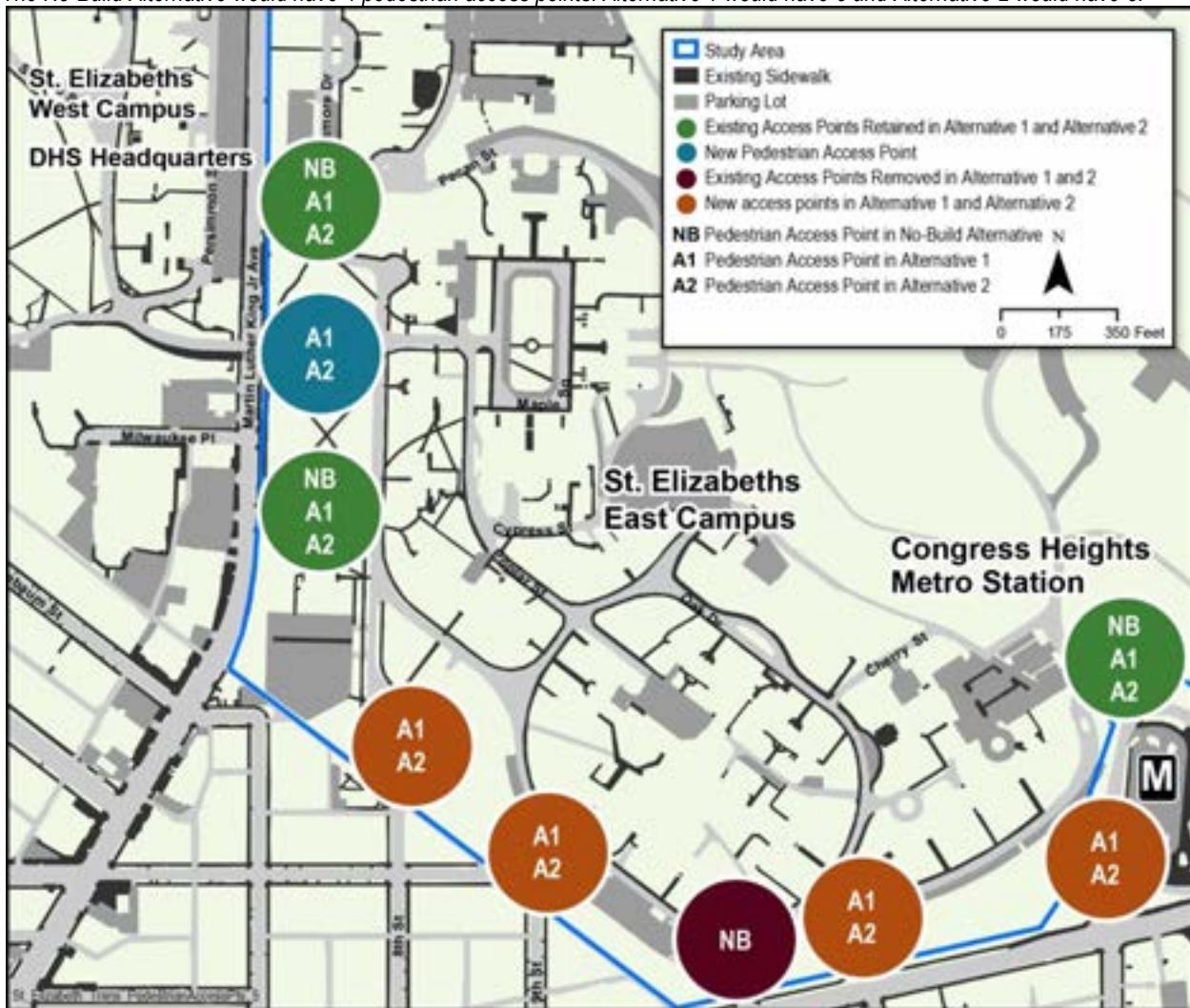
Pedestrian connectivity in the area is obstructed by two major barriers: Suitland Pkwy. located to the north of East Campus and the existing East Campus, itself. Pedestrians can traverse Suitland Pkwy. at only three locations near the study area: at its intersection with Stanton Rd.; at the pedestrian bridge near Dunbar Rd.; and at the Martin Luther King Jr Ave. bridge. Pedestrian connections between East Campus and the existing neighborhoods are limited. Travelers must walk around the campus along the surface street network. A walkway is provided along the southwest boundary of East Campus, connecting Alabama Ave. and Martin Luther King Jr Ave. but does not connect to paths within the campus. Connections into East Campus are located at 11<sup>th</sup> Pl., Cypress St., Pecan St., Redwood Dr., and the Congress Heights Metro Station at security checkpoints. Three streets, 8<sup>th</sup> Sts, 9<sup>th</sup> St., and Malcolm X Ave. dead end into the border of East Campus and do not provide pedestrian connections into the campus.

### Build Alternatives

Both Alternatives 1 and 2 would provide pedestrian networks within East Campus that support the primary goals of the DC Pedestrian Master Plan, namely creating "a city where any trip can be taken on foot safely, comfortably, and where roadways equally serve pedestrians, bicyclists, transit users and motorists." Pedestrian access would be permitted and accommodated through the campus itself, helping to increase pedestrian activity by making walking comfortable and convenient. The existing sidewalk and street network in the campus will be upgraded to provide a high level of service for pedestrians. All road connections into East Campus would include sidewalks on both sides of the street. In Alternative 1 and Alternative 2, pedestrian connections into East Campus would be increased from four to eight. Residents in the neighborhoods surrounding the campus, especially residents along Malcolm X Ave, 8<sup>th</sup> St. and 9<sup>th</sup> St. will experience increased connectivity, improved safety, and shorter walk times. Figure 12 highlights where additional pedestrian access points would be located under Alternative 1 and Alternative 2.

**FIGURE 12**

Existing Pedestrian Network and Pedestrian Access Points in the No-Build Alternative, Alternative 1, and Alternative 2  
 The No-Build Alternative would have 4 pedestrian access points. Alternative 1 would have 8 and Alternative 2 would have 8.



## 2.5 Bicycles

### No-Build Alternative

There are currently no on-street bicycle facilities near East Campus. The major roadways in the area, Alabama Ave., Martin Luther King Jr Ave., and Malcolm X Ave., all have relatively high traffic speeds and volume, which makes cycling in the area uncomfortable and potentially unsafe. Existing roadways within East Campus lack sufficient width to maintain safe separation between cyclists and vehicular traffic. The District of Columbia's *Bicycle Master Plan* proposes installing bike lanes along Martin Luther King Jr Ave. and 13<sup>th</sup> Street, but they are not planned for construction in the near-term.

### Build Alternatives

Alternative 1 and Alternative 2 would open the campus's roadway network to cyclists, providing alternative bicycle connections to Alabama Ave. and Martin Luther King, Jr. Ave. The low-speed nature of the proposed street network on the East Campus would accommodate

cyclists with safe and attractive facilities, providing a parallel network to the primary facilities mentioned above. Both of the alternatives provide on street bicycle lanes along 13<sup>th</sup> St. Improving bicycle facilities would make cycling a more attractive option and contribute to a mode shift away from single-occupancy vehicles.

## 2.6 Transit

The Washington Metropolitan Area Transit Authority (WMATA) provides bus and heavy rail transit service in the areas surrounding East Campus. The Congress Heights Metro Station provides access to the region's heavy rail system - Metrorail. The station is located along the Green Line. WMATA operates 16 bus routes (Metrobus) along Martin Luther King Jr Ave., Alabama Ave., and Stanton Rd. /12<sup>th</sup> Pl. Table 1 lists the Metrobus routes serving the East Campus area.

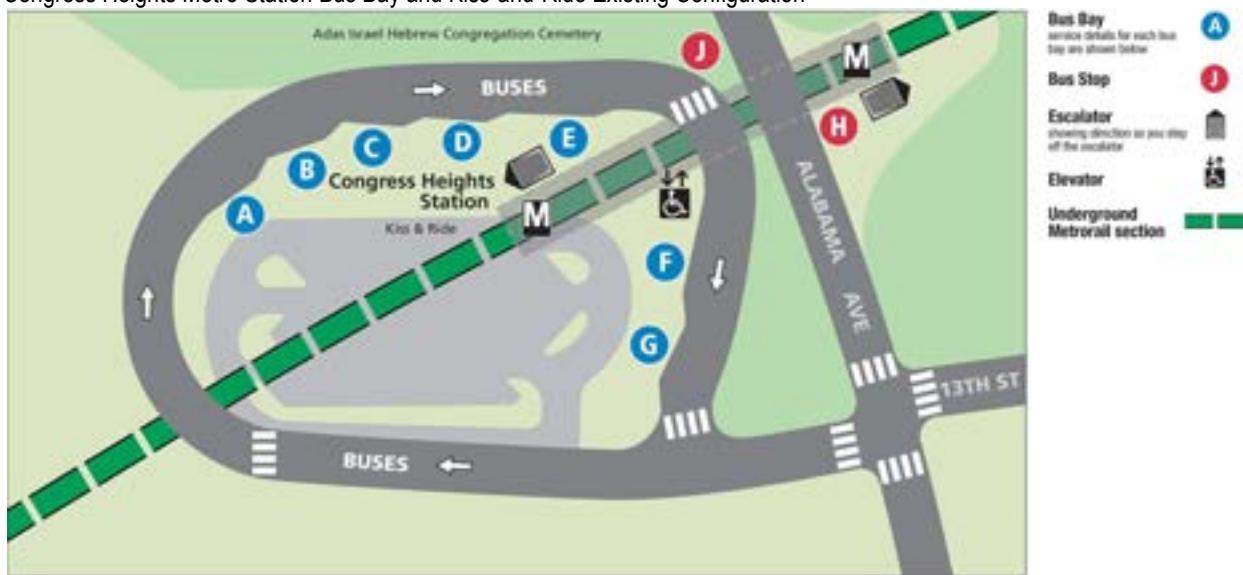
**TABLE 1**  
Existing Bus Service in the East Campus Area  
*16 Metrobus routes operated by WMATA serve the areas surrounding East Campus*

Bus Route	Description	Average Weekday Ridership 2010 - 2011	Peak Hour Frequency	Corridor or Area Served
92/93	U Street-Garfield Line	12,616	15 min	Congress Heights Metro Station
A2,6,7,8,42,46, 48	Anacostia-Congress Heights Line	11,557	8-15 min	Martin Luther King Jr. Ave. and Malcolm X Ave.
A4/A5	Anacostia-Fort Drum Line	2,848	8-10 min	Martin Luther King Jr. Ave. and Malcolm X Ave.
M8/M9	Congress Heights Shuttle Line	903	15-20 min	Congress Heights Metro Station
W2/W3	United Medical Center-Anacostia Line	2,761	20 min	Congress Heights Metro Station and Alabama Ave.
W4	Deanwood-Alabama Ave. Line	4,986	10 min	Malcolm X Ave., Martin Luther King Jr. Ave., Alabama Ave., Congress Heights Metro Station

Source: (WMATA 2011a)

The Congress Heights Metro Station is located near the southeast corner of East Campus, and, as such, nearly half of the ½-mile station area falls within East Campus. Walking access is available for residents in neighborhoods to the south of Alabama Ave., but the majority of transit riders - 59 percent of the 2,400 daily boardings - (WMATA 2008) access the station by driving or bus transfer. Twelve Metrobus routes pick up and drop off passengers at the Congress Heights Station, and bus stops are found along all major streets in the area. Figure 13 illustrates the current configuration of bus bays at the Congress Heights Metro Station.

**FIGURE 13**  
Congress Heights Metro Station Bus Bay and Kiss-and-Ride Existing Configuration



Source: (WMATA 2011b)

WMATA continually evaluates bus service operations and adjusts routes and frequencies. The following modifications are currently under study (WMATA 2011c):

- A-Line (Anacostia-Congress Heights)
 

*A7 and A9: Increase Frequency to 10 minutes in both directions along Martin Luther King Jr. Ave.  
A5: Modify to serve St. Elizabeth's West Campus*
- New W1 Line (or reorganization of M8 and M9 line)
 

*Serve shopping areas along Alabama Ave. and Congress Heights  
20 minute frequency during peak periods*
- 92/93 Line (U Street – Garfield)
 

*Currently one of the highest ridership lines for WMATA. Studies currently being conducted to improve service.*

As East Campus is redeveloped into a mixed-use community, it is estimated that 30-40 percent of travelers to the development would arrive by transit, either on Metrorail or Metrobus. Transportation Demand Management (TDM) will encourage a high level of transit use to the redeveloped campus.

As part of the relocation of DHS to West Campus and the relocation of FEMA to the East Campus North Parcel, employee shuttle service between the Congress Heights Metro Station is expected to be implemented. Table 2 summarizes the implementation plan for this shuttle service.

**TABLE 2**  
Planned DHS Shuttles Serving the Congress Heights Metro Station

Station Origin – Gate Destination	Passenger Demand (per hour)	Round-trip Time (min)	Shuttle Trips (per hour)	Shuttles Required	Passenger Capacity (per hour)
Congress Heights Metro Station to DHS Headquarters Gate 4	397	30	10	5	400
Anacostia Metro Station to DHS Headquarters Gate 4	793	30	20	10	800
Congress Heights to FEMA Headquarters Pecan Street Gate	910	20	24	8	960
<b>TOTALS</b>	<b>2,100</b>		<b>54</b>	<b>23</b>	<b>2,160</b>

Approximately 24 shuttles trips per hour during peak periods are expected between the Congress Heights Metro Station and FEMA. Another 10 shuttle trips per hour are expected between the Congress Heights Metro Station and the West Campus. Depending on the alternative, these shuttles may be able to utilize the street network on East Campus or would need to be accommodated on the existing streets.

### No-Build Alternative

Under the No-Build Alternative, the roadway network around the East Campus, including Alabama Ave. and Martin Luther King, Jr. Ave., would be relatively congested, particularly during the AM and PM peak hours. If the existing East Campus roadway network is retained under the No-Build Alternative, it would be difficult to accommodate both transit and general vehicular traffic. The existing roadways are narrow and winding with no traffic control devices. Existing Metrobus service along with the proposed DHS and FEMA shuttles would have to be accommodated on the existing street network outside of East Campus. Bus service would be slow and unreliable. Figure 14 illustrates the routes of existing Metrobus service. The red dashed lines in Figure 14 illustrate the assumed routes for DHS and FEMA shuttles if they were accommodated on existing streets under the No-Build Alternative.

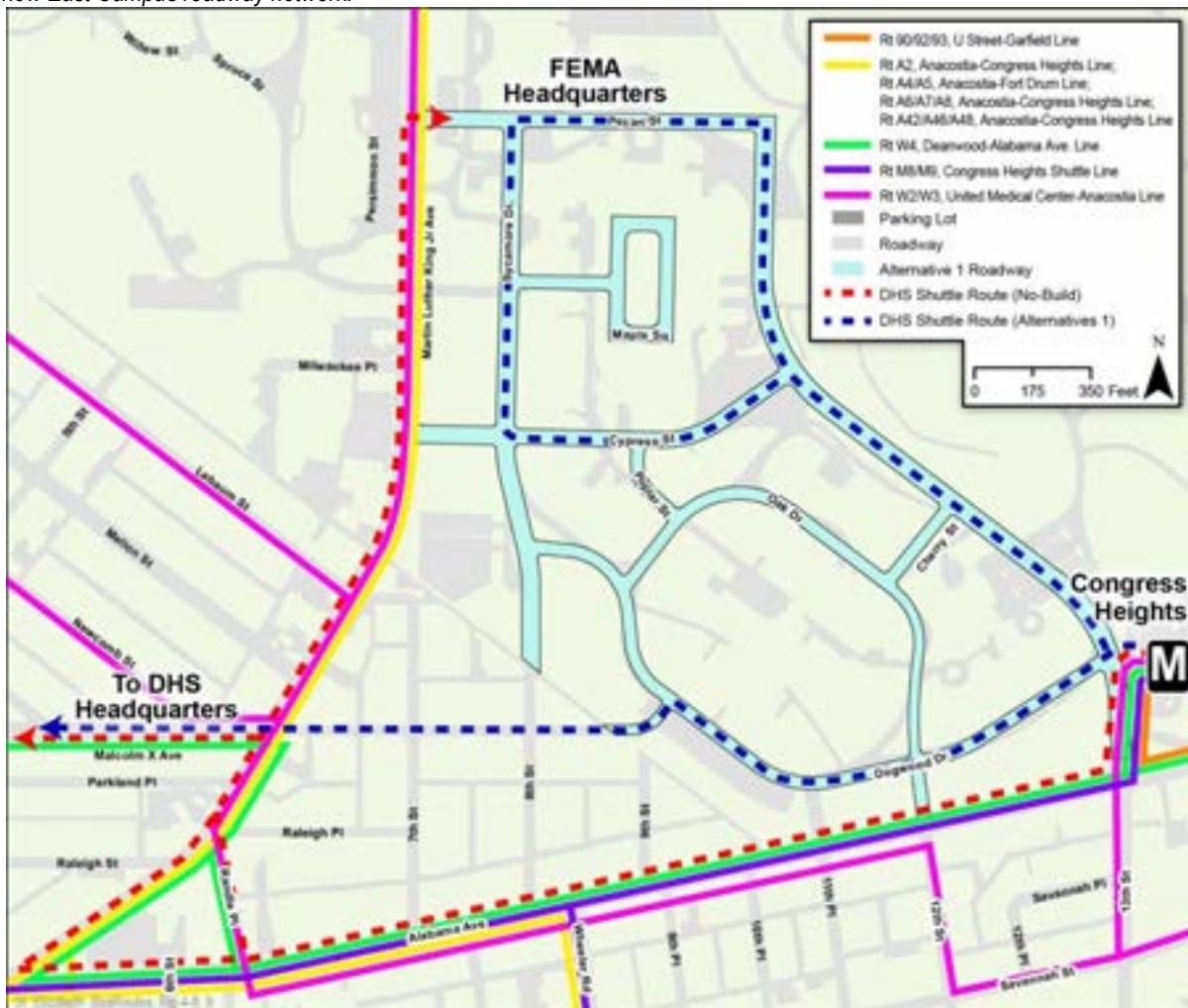
### Alternative 1

Alternative 1 would open up East Campus to pedestrian and transit travel. As a result, all of the campus would be within a comfortable walking distance (less than a ½-mile) of the Congress Heights Metro Station. The on-campus street network will also provide relief to Martin Luther King Jr Ave. and Alabama Ave., which may offer more direct connections and expanded service coverage for Metrobus. The new roadways would also provide a more reliable and direct route for the approximately 34 shuttle trips per hour between the Congress Heights Metro Station and the DHS and FEMA headquarters. The blue dashed line in Figure 14 illustrates the proposed DHS and FEMA shuttle routes through East Campus under Alternative 1. The shuttle to the DHS headquarters would utilize Dogwood Dr. and Malcolm X Ave. The shuttle to the FEMA headquarters would utilize 13<sup>th</sup> St., Sycamore Dr., and Cypress St.

**FIGURE 14**

Existing Metrobus Routes and Proposed DHS and FEMA Shuttle Routes: No Build and Alternative 1

*In the No-Build Alternative, DHS shuttles would run on existing roadways. Under Alternative 1, DHS shuttles would utilize the new East Campus roadway network.*



## Alternative 2

Generally, Alternative 2 would provide the same improvements to pedestrian and transit travel as Alternative 1. Alternative 2 however; would also provide better routing options for the proposed DHS and FEMA shuttle routes. Similar to Alternative 1, the campus would be within walking distance of the Congress Heights Metro Station. The proposed on-campus network would also provide alternative routes and offer more direct connections for expanded Metrobus service.

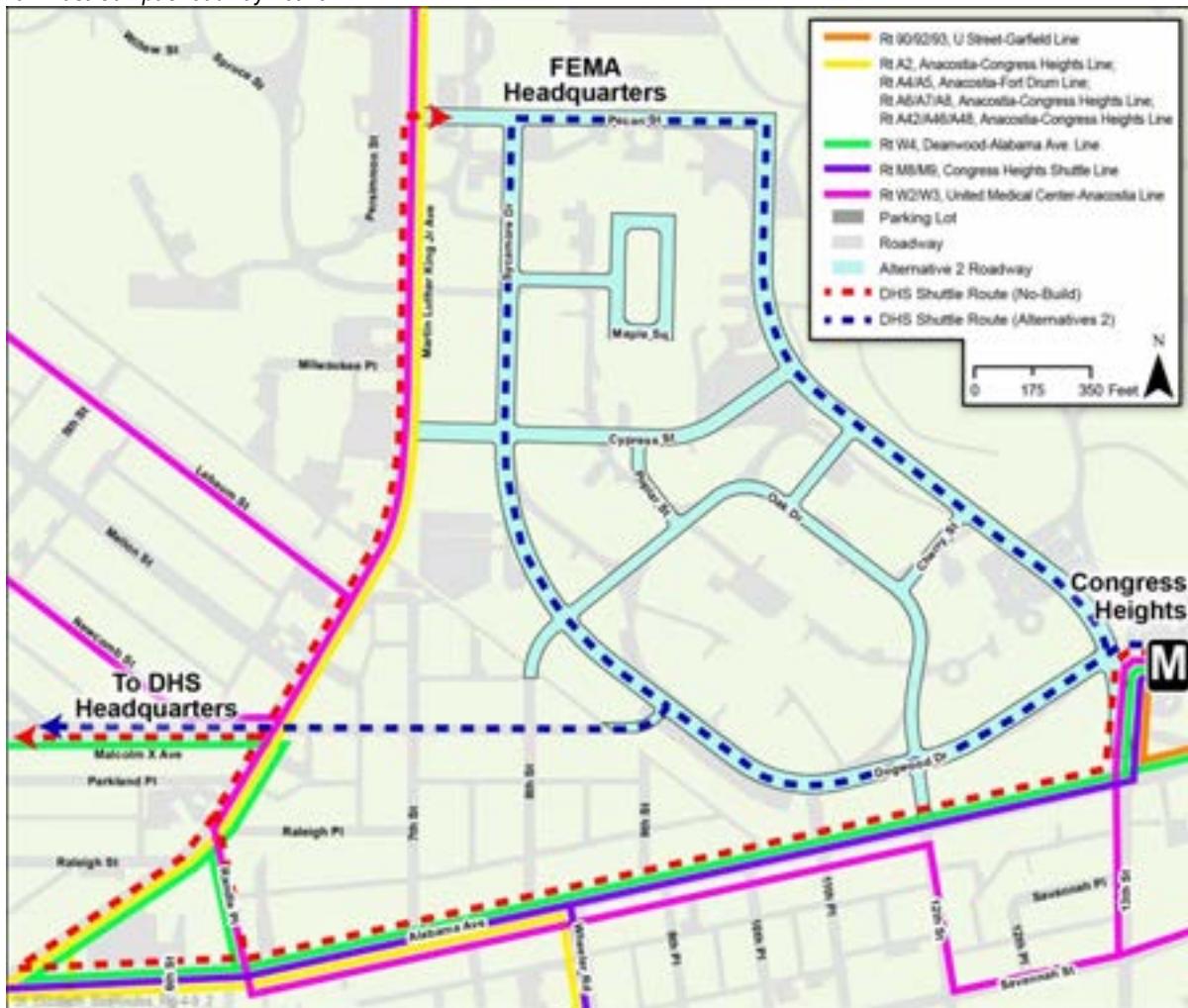
The blue dashed line in Figure 15 illustrates the proposed FEMA and DHS shuttle routes under Alternative 2. The Congress Heights Metro Station to DHS headquarters shuttle route would be similar to the route provided in Alternative 1. This route would utilize Dogwood Dr. and Malcolm X Ave. The FEMA headquarters route would operate better under Alternative 2. Instead of making left turns from Sycamore St. onto Cypress St. and from 13<sup>th</sup> St. into the Congress Heights Metro station under Alternative 1, this route would stay on the direct route

provided by Dogwood Dr. and Sycamore St. in Alternative 2. This route reduces the number of left turns the FEMA shuttle would need to make.

**FIGURE 15**

Existing Metrobus Routes and Proposed DHS and FEMA Shuttle Routes: No Build and Alternative 2

*In the No-Build Alternative, DHS shuttles would run on existing roadways. Under Alternative 2, DHS shuttles would utilize the new East Campus roadway network.*



### 3. Summary of Impacts

#### 3.1 No-Build Alternative

##### Direct Effects

Under the No-Build Alternative, the redevelopment of East Campus would occur using the existing transportation network. This would result in negative impacts for vehicular traffic, parking, pedestrians, bicyclists, and transit vehicles that would access and travel within the site. The existing roadway network, with narrow and winding roads would not be able to accommodate on-street parking, safe routes for bicyclists, and adequate turning radii for transit vehicles while maintaining at least two travel lanes for general vehicular traffic. Pedestrian access to the site would be limited. Neighboring residents, particularly along Malcolm X Ave, 8<sup>th</sup> St, and 7<sup>th</sup> St., would be isolated from the redevelopment even though they would directly

border the site. Given the narrow road widths, proposed shuttles to the DHS and FEMA headquarters would not be accommodated on the existing roadways within the campus.

### **Indirect Effects**

Under the No-Build Alternative, the existing roadway network provides poor connectivity with the surrounding neighborhoods. This will result in negative indirect impacts for vehicular traffic, trucks, parking, and transit. Poor connectivity would result in higher cut through traffic in the existing surrounding residential neighborhoods. Under the No-Build Alternative, Martin Luther King Jr. Ave. would remain as the primary north-south route through the project area while Alabama Ave. and Malcolm X Ave. would remain the primary east-west route. The residential neighborhood where these three roads intersect would continue to experience high cut through volumes. Existing cut-through routes on Malcolm X Ave., 7<sup>th</sup> St., and 8<sup>th</sup> St. would become worse resulting in higher intersection delays and poor LOS. This would also negatively affect existing transit routes on Martin Luther King Jr. Ave. and Alabama Ave. that would travel within the same congested conditions. The existing on-campus network would not accommodate additional on-street parking. Existing streets surrounding East Campus would experience negative indirect effects as visitors and residents to the redeveloped East Campus would have to utilize existing streets for on-street parking.

### **Cumulative Effects**

The relocation of the DHS Headquarters and FEMA Headquarters along with the redevelopment of East Campus into a mixed use community will increase traffic demand along with demand for other modes of transportation – transit, pedestrian, and bicyclists. Transportation improvements, some with major regional significance, are expected to be in place to coincide with these land use changes. A reconfigured interchange at I-295 and Malcolm X Ave. along with a new interchange at Martin Luther King Jr. Ave and Suitland Pkwy. will improve regional accessibility to the East Campus area. Improvements to Martin Luther King Jr. Ave. will provide improved pedestrian facilities.

Under the No-Build Alternative, significant land use changes along with major transportation improvements would occur; yet the internal East Campus transportation network would remain the same. As East Campus and West Campus redevelop, transportation improvements outside of East Campus would occur to meet new demands for vehicular traffic and other alternative modes. The existing East Campus network - built originally to restrict access to the campus and accommodate only those visiting or working at the original hospital – would be ill prepared to meet these very different transportation demands.

## **3.2 Build Alternatives**

### **Direct Effects**

Under the Build Alternatives a transportation network that accommodates all modes would be provided; resulting in direct benefits for vehicular traffic, parking, pedestrians, bicyclists, and transit. Road widths throughout the campus would accommodate on-street parking, transit vehicles, and at least two travel lanes. Sidewalks would be provided along both sides of all streets. 13<sup>th</sup> St. would provide separated bicycle lanes. New access points into East Campus would provide additional pedestrian connections between the campus and surrounding

neighborhoods. DHS and FEMA shuttles would be accommodated on the internal campus roadways providing more direct routes to both headquarters.

Intersection LOS generally improves or remains the same when compared to the No-Build Alternative for intersections directly bordering East Campus.

### **Indirect Effects**

There are no negative indirect effects under either Alternative 1 or Alternative 2.

The Build Alternatives would provide new parallel north-south and east-west routes resulting in indirect benefits to vehicular traffic, trucks, parking, and transit. The extension of 13<sup>th</sup> St., Pecan St., and Cypress St. would provide a grid network within East Campus that would be integrated with the surrounding neighborhoods. This will result in shifts in vehicular traffic from congested cut-through routes on Malcolm X Ave., 7<sup>th</sup> St., and 8<sup>th</sup> St. to the new roads on East Campus. Intersection delay would be lowered and LOS improved for intersections within the vicinity of East Campus. Existing transit service would indirectly benefit from less congested conditions on Alabama Ave. and Martin Luther King Jr. Ave. Existing streets surrounding East Campus would also indirectly benefit as on-street parking demand would be accommodated within the campus with less spill-over onto neighboring streets.

### **Cumulative Effects**

Since there are no negative indirect effects under Alternative 1 and Alternative 2, there are no negative cumulative effects.

The Build Alternatives would provide East Campus with a new multi-modal transportation network accommodating vehicular traffic, trucks, parking, pedestrian, bicyclists, and transit service. It would connect the campus to the surrounding neighborhoods. These improvements would be more compatible and complement the transportation improvements expected to occur in the vicinity of East Campus. The transportation network would be better prepared to meet new transportation demands that are expected with the redevelopment of East Campus, the relocation of FEMA to the East Campus North Parcel, and the relocation of DHS to St. Elizabeth's West Campus.

## **4. References**

DCOP (District of Columbia Office of Planning and Office of the Deputy Mayor for Planning and Economic Development). 2008. Saint Elizabeths East: Redevelopment Framework Plan, 2008. Accessed Available at <http://planning.dc.gov/DC/Planning/In+Your+ Neighborhood/Wards/Ward+8/Small+Area+Plans+&+Studies/Saint+Elizabeths+East+Redevelopment+Framework+Plan>.

WMATA (Washington Metropolitan Area Transit Authority) 2008. Station Site and Access Planning Manual. Appendix C – Metrorail Boardings by Station and Mode. Accessed on October 4, 2011. Available at <http://wmata.com/pdfs/planning/Station%20Access/SSAPM.pdf>

WMATA (Washington Metropolitan Area Transit Authority) 2011a. 2011 Metrobus Ridership by Line. Accessed on October 4, 2011. Available at [http://wmata.com/about\\_metro/planning\\_dev.cfm](http://wmata.com/about_metro/planning_dev.cfm).

WMATA (Washington Metropolitan Area Transit Authority) 2011b. Bus Bay Information from Congress Heights Station. Accessed on October 4, 2011. Available at [http://wmata.com/rail/station\\_detail.cfm?station\\_id=86](http://wmata.com/rail/station_detail.cfm?station_id=86)

WMATA (Washington Metropolitan Area Transit Authority) 2011c. Metrobus Studies. WMATA's Official Website for the Priority Corridor Restructuring Series. Accessed on October 4, 2011. Available at <http://www.metrobus-studies.com/>

## **Appendix – Synchro and VISSIM Output Files**

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# Existing AM

# HCM Unsignalized Intersection Capacity Analysis

21: Lebaum St & M.L.King Ave

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	5	15	10	315	30	655	0	0	375	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	16	11	342	33	712	0	0	408	5
Pedestrians		63			30			14			43	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		5			2			1			4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								433			535	
pX, platoon unblocked	0.93	0.93	0.97	0.93	0.93	0.91	0.97				0.91	
vC, conflicting volume	1285	1280	487	1237	1283	429	476				742	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1047	1042	454	995	1045	179	442				522	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	92	100	99	90	94	52	97				100	
cM capacity (veh/h)	71	189	502	162	189	714	1022				924	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	11	370	270	475	413							
Volume Left	5	16	33	0	0							
Volume Right	5	342	0	0	5							
cSH	124	579	1022	1700	1700							
Volume to Capacity	0.09	0.64	0.03	0.28	0.24							
Queue Length 95th (ft)	7	113	2	0	0							
Control Delay (s)	36.9	21.5	1.3	0.0	0.0							
Lane LOS	E	C	A									
Approach Delay (s)	36.9	21.5	0.5		0.0							
Approach LOS	E	C										
<b>Intersection Summary</b>												
Average Delay			5.7									
Intersection Capacity Utilization			71.0%		ICU Level of Service				C			
Analysis Period (min)			15									

# HCM Signalized Intersection Capacity Analysis

26: Malcolm X Aven & M.L.King Ave

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	155	90	5	450	75	220	535	20	105	230	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor												
Frpb, ped/bikes	0.98				0.99			0.99			0.97	
Flpb, ped/bikes	1.00				1.00			1.00			0.99	
Fr <sub>t</sub>	0.96				0.98			1.00			0.98	
Fl <sub>t</sub> Protected	0.99				1.00			0.99			0.99	
Satd. Flow (prot)	1736				1811			3457			1725	
Fl <sub>t</sub> Permitted	0.72				1.00			0.63			0.64	
Satd. Flow (perm)	1271				1807			2222			1124	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	83	172	100	6	500	83	244	594	22	117	256	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	355	0	0	589	0	0	860	0	0	440	0
Confl. Peds. (#/hr)	32		35	35		32	58		67	67		58
Turn Type	Perm				Perm			pm+pt			Perm	
Protected Phases		4				8		5	2			6
Permitted Phases	4				8			2			6	
Actuated Green, G (s)	44.0				44.0			48.0			38.0	
Effective Green, g (s)	46.0				46.0			50.0			40.0	
Actuated g/C Ratio	0.46				0.46			0.50			0.40	
Clearance Time (s)	4.0				4.0			4.0			4.0	
Lane Grp Cap (vph)	585				831			1210			450	
v/s Ratio Prot								c0.06				
v/s Ratio Perm	0.28				c0.33			0.30			c0.39	
v/c Ratio	0.61				0.71			0.71			0.98	
Uniform Delay, d1	20.2				21.6			19.4			29.6	
Progression Factor	1.00				1.00			0.61			0.98	
Incremental Delay, d2	4.6				5.1			3.0			37.2	
Delay (s)	24.9				26.7			14.8			66.2	
Level of Service	C				C			B			E	
Approach Delay (s)	24.9				26.7			14.8			66.2	
Approach LOS	C				C			B			E	
<b>Intersection Summary</b>												
HCM Average Control Delay	29.6				HCM Level of Service			C				
HCM Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)			6.0				
Intersection Capacity Utilization	105.1%				ICU Level of Service			G				
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

27: Raleigh PI & M.L.King Ave

9/29/2011

Movement	WBL	WBR	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations	Y	Y	Y	Y	Y	Y	Y	Y
Volume (vph)	10	65	10	60	650	0	100	225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0		3.0		2.0	3.0
Lane Util. Factor	1.00		1.00		0.95		1.00	1.00
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Fr <sub>t</sub>	0.88		0.88		1.00		1.00	1.00
Fl <sub>t</sub> Protected	0.99		0.99		1.00		0.95	1.00
Satd. Flow (prot)	1634		1631		3539		1770	1863
Fl <sub>t</sub> Permitted	0.99		0.97		1.00		0.20	1.00
Satd. Flow (perm)	1634		1587		3539		369	1863
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	72	11	67	722	0	111	250
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	83	0	78	0	722	0	111	250
Confl. Peds. (#/hr)				13				
Turn Type						pm+pt		
Protected Phases	8				2		1	2
Permitted Phases			1				2	
Actuated Green, G (s)	31.0		26.0		30.0		56.0	30.0
Effective Green, g (s)	32.0		27.0		32.0		60.0	32.0
Actuated g/C Ratio	0.32		0.27		0.32		0.60	0.32
Clearance Time (s)	4.0		4.0		5.0		4.0	5.0
Vehicle Extension (s)	3.0		1.0		1.0		1.0	1.0
Lane Grp Cap (vph)	523		428		1132		614	596
v/s Ratio Prot	c0.05				c0.20		c0.05	0.13
v/s Ratio Perm			0.05				0.06	
v/c Ratio	0.16		0.18		0.64		0.18	0.42
Uniform Delay, d1	24.4		28.0		29.0		9.9	26.7
Progression Factor	1.00		0.87		1.12		1.54	1.18
Incremental Delay, d2	0.6		0.9		2.7		0.3	1.0
Delay (s)	25.0		25.3		35.2		15.6	32.6
Level of Service	C		C		D		B	C
Approach Delay (s)	25.0		25.3		35.2			27.4
Approach LOS	C		C		D			C
Intersection Summary								
HCM Average Control Delay		31.7			HCM Level of Service		C	
HCM Volume to Capacity ratio		0.33						
Actuated Cycle Length (s)		100.0			Sum of lost time (s)		8.0	
Intersection Capacity Utilization		48.8%			ICU Level of Service		A	
Analysis Period (min)		15						

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

29: Alabama Ave & Randle Pl

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	210	5	10	210	55	0	5	10	70	10	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor	0.95				1.00	1.00		1.00			1.00	
Frpb, ped/bikes	1.00				1.00	0.78		0.96			0.95	
Flpb, ped/bikes	0.99				0.99	1.00		1.00			1.00	
Fr <sub>t</sub>	1.00				1.00	0.85		0.91			0.97	
Flt Protected	1.00				1.00	1.00		1.00			0.97	
Satd. Flow (prot)	3480				1848	1227		1635			1662	
Flt Permitted	0.94				0.99	1.00		1.00			0.97	
Satd. Flow (perm)	3283				1825	1227		1635			1662	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	233	6	11	233	61	0	6	11	78	11	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	250	0	0	244	61	0	17	0	0	111	0
Confl. Peds. (#/hr)	46		39	39		46	63		3	3		63
Turn Type	Perm				Perm		Perm	Split			Split	
Protected Phases		2				6		7	7		8	8
Permitted Phases	2				6		6					
Actuated Green, G (s)	65.3				65.3	65.3		2.8			13.9	
Effective Green, g (s)	66.3				66.3	66.3		3.8			14.9	
Actuated g/C Ratio	0.66				0.66	0.66		0.04			0.15	
Clearance Time (s)	6.0				6.0	6.0		6.0			6.0	
Vehicle Extension (s)	1.0				1.0	1.0		3.0			3.0	
Lane Grp Cap (vph)	2177				1210	814		62			248	
v/s Ratio Prot								c0.01			c0.07	
v/s Ratio Perm	0.08				c0.13	0.05						
v/c Ratio	0.11				0.20	0.07		0.27			0.45	
Uniform Delay, d1	6.1				6.6	6.0		46.8			38.8	
Progression Factor	1.89				1.20	1.20		1.00			1.02	
Incremental Delay, d2	0.1				0.3	0.1		2.4			1.3	
Delay (s)	11.7				8.1	7.3		49.2			41.0	
Level of Service	B				A	A		D			D	
Approach Delay (s)	11.7				8.0			49.2			41.0	
Approach LOS	B				A			D			D	
<b>Intersection Summary</b>												
HCM Average Control Delay	15.7				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.25											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)				15.0			
Intersection Capacity Utilization	40.7%				ICU Level of Service				A			
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

30: Alabama Ave & Wheeler Rd

9/29/2011

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↖	↙	↖↑	↖	↖
Volume (vph)	320	155	40	535	645	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	4.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	1863	1583		3527	1770	1583
Fl <sub>t</sub> Permitted	1.00	1.00		0.90	0.95	1.00
Satd. Flow (perm)	1863	1583		3197	1770	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	356	172	44	594	717	83
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	356	172	0	638	717	83
Confl. Peds. (#/hr)		16	16		1	4
Turn Type	custom	pm+pt			pt+ov	
Protected Phases	4 5	2 5	3	8	2	2 3
Permitted Phases			8			
Actuated Green, G (s)	38.0	63.0		50.0	40.0	52.0
Effective Green, g (s)	40.0	64.0		52.0	42.0	54.0
Actuated g/C Ratio	0.40	0.64		0.52	0.42	0.54
Clearance Time (s)				5.0	5.0	
Lane Grp Cap (vph)	745	1013		1692	743	855
v/s Ratio Prot	c0.19	0.11		c0.03	c0.41	0.05
v/s Ratio Perm			0.16			
v/c Ratio	0.48	0.17		0.38	0.97	0.10
Uniform Delay, d1	22.3	7.3		14.3	28.3	11.2
Progression Factor	1.19	0.03		1.40	1.00	1.00
Incremental Delay, d2	2.1	0.3		0.6	25.5	0.2
Delay (s)	28.6	0.6		20.6	53.8	11.4
Level of Service	C	A		C	D	B
Approach Delay (s)	19.5			20.6	49.4	
Approach LOS	B			C	D	
<b>Intersection Summary</b>						
HCM Average Control Delay	32.0		HCM Level of Service		C	
HCM Volume to Capacity ratio	0.69					
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0	
Intersection Capacity Utilization	78.5%		ICU Level of Service		D	
Analysis Period (min)	15					
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

31: Alabama Ave & 11th Pl

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (vph)	80	300	15	15	510	50	20	15	15	25	10	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0			3.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			0.99			0.99			0.98	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Fr <sub>t</sub>		0.99			0.99			0.96			0.92	
Flt Protected		0.99			1.00			0.98			0.98	
Satd. Flow (prot)		1811			1817			1730			1657	
Flt Permitted		0.80			0.99			0.80			0.90	
Satd. Flow (perm)		1454			1794			1418			1515	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	333	17	17	567	56	22	17	17	28	11	50
RTOR Reduction (vph)	0	1	0	0	2	0	0	15	0	0	45	0
Lane Group Flow (vph)	0	438	0	0	638	0	0	41	0	0	44	0
Confl. Peds. (#/hr)	26		40	40		26	5		2	2		5
Turn Type	Perm				Perm			Perm			Perm	
Protected Phases		2			2			4			4	
Permitted Phases	2				2			4			4	
Actuated Green, G (s)		82.4			82.4			7.6			7.6	
Effective Green, g (s)		84.4			84.4			9.6			9.6	
Actuated g/C Ratio		0.84			0.84			0.10			0.10	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		1.0			1.0			3.0			3.0	
Lane Grp Cap (vph)		1227			1514			136			145	
v/s Ratio Prot												
v/s Ratio Perm		0.30			c0.36			0.03			c0.03	
v/c Ratio		0.36			0.42			0.30			0.30	
Uniform Delay, d1		1.7			1.9			42.1			42.1	
Progression Factor		0.71			5.81			1.00			1.00	
Incremental Delay, d2		0.8			0.8			1.2			1.2	
Delay (s)		2.0			11.8			43.3			43.3	
Level of Service		A			B			D			D	
Approach Delay (s)		2.0			11.8			43.3			43.3	
Approach LOS		A			B			D			D	
<b>Intersection Summary</b>												
HCM Average Control Delay		12.0			HCM Level of Service				B			
HCM Volume to Capacity ratio		0.41										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)				6.0			
Intersection Capacity Utilization		69.1%			ICU Level of Service				C			
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

32: Alabama Ave & WMATA Drive

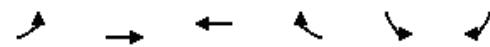
9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑↑			↔		↑	↑	↑
Volume (vph)	45	280	15	15	510	50	30	15	45	40	10	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.5	3.0			3.5		3.5	3.5	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.84	1.00	1.00			0.98		1.00	1.00	0.91
Flpb, ped/bikes	1.00	1.00	1.00	0.97	1.00			0.97		0.98	1.00	1.00
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.99			0.93		1.00	1.00	0.85
Fl <sub>t</sub> Protected	0.95	1.00	1.00	0.95	1.00			0.98		0.95	1.00	1.00
Satd. Flow (prot)	1767	1863	1324	1719	3481			1626		1729	1863	1443
Fl <sub>t</sub> Permitted	0.32	1.00	1.00	0.45	1.00			0.92		0.69	1.00	1.00
Satd. Flow (perm)	603	1863	1324	822	3481			1527		1264	1863	1443
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	50	311	17	17	567	56	33	17	50	44	11	39
RTOR Reduction (vph)	0	0	8	0	7	0	0	31	0	0	0	25
Lane Group Flow (vph)	50	311	9	17	616	0	0	69	0	44	11	14
Confl. Peds. (#/hr)	7		44	44		7	94		20	20		94
Turn Type	pm+pt		Perm	pm+pt			Perm			Perm		Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	50.0	42.0	42.0	50.0	42.0			36.0		36.0	36.0	36.0
Effective Green, g (s)	52.0	44.0	43.0	51.0	44.0			37.5		37.5	37.5	37.0
Actuated g/C Ratio	0.52	0.44	0.43	0.51	0.44			0.38		0.38	0.38	0.37
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0			5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	418	820	569	495	1532			573		474	699	534
v/s Ratio Prot	c0.01	0.17		0.00	c0.18						0.01	
v/s Ratio Perm	0.05		0.01	0.01				c0.05		0.03		0.01
v/c Ratio	0.12	0.38	0.02	0.03	0.40			0.12		0.09	0.02	0.03
Uniform Delay, d1	12.3	18.8	16.4	12.5	19.0			20.5		20.2	19.6	20.0
Progression Factor	0.37	0.67	0.46	0.45	0.79			1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	1.3	0.0	0.1	0.8			0.4		0.4	0.0	0.1
Delay (s)	5.1	13.8	7.5	5.7	15.7			20.9		20.6	19.7	20.1
Level of Service	A	B	A	A	B			C		C	B	C
Approach Delay (s)		12.4			15.5			20.9			20.3	
Approach LOS		B			B			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay		15.3				HCM Level of Service			B			
HCM Volume to Capacity ratio		0.26										
Actuated Cycle Length (s)		100.0				Sum of lost time (s)			9.5			
Intersection Capacity Utilization		89.2%				ICU Level of Service			E			
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

45: Alabama Ave & 7th St

9/29/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↑↑	
Volume (vph)	10	280	265	420	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0		3.0	
Lane Util. Factor		0.95	1.00		1.00	
Frpb, ped/bikes		1.00	0.97		1.00	
Flpb, ped/bikes		1.00	1.00		1.00	
Fr <sub>t</sub>		1.00	0.92		0.99	
Flt Protected		1.00	1.00		0.95	
Satd. Flow (prot)		3533	1662		1767	
Flt Permitted		0.93	1.00		0.95	
Satd. Flow (perm)		3293	1662		1767	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	311	294	467	250	11
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	322	761	0	261	0
Confl. Peds. (#/hr)	12			12	8	
Turn Type	Perm					
Protected Phases		2	2		4	
Permitted Phases	2					
Actuated Green, G (s)		70.5	70.5		19.5	
Effective Green, g (s)		72.5	72.5		21.5	
Actuated g/C Ratio		0.72	0.72		0.22	
Clearance Time (s)		5.0	5.0		5.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		2387	1205		380	
v/s Ratio Prot		c0.46		c0.15		
v/s Ratio Perm		0.10				
v/c Ratio		0.13	0.63		0.69	
Uniform Delay, d1		4.2	7.0		36.1	
Progression Factor		1.44	1.20		1.00	
Incremental Delay, d2		0.1	1.8		5.1	
Delay (s)		6.2	10.2		41.2	
Level of Service		A	B		D	
Approach Delay (s)		6.2	10.2		41.2	
Approach LOS		A	B		D	
<b>Intersection Summary</b>						
HCM Average Control Delay		15.2		HCM Level of Service		B
HCM Volume to Capacity ratio		0.64				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		60.2%		ICU Level of Service		B
Analysis Period (min)		15				

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

46: Eliz Gate 4 & M.L.King Ave

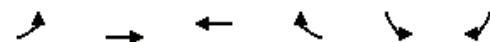
9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	0	30	0	0	0	10	965	0	0	350	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor												
Frpb, ped/bikes												
Flpb, ped/bikes												
Fr <sub>t</sub>												
Flt Protected												
Satd. Flow (prot)												
Flt Permitted												
Satd. Flow (perm)												
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	0	33	0	0	0	11	1072	0	0	389	11
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	64	0	0	0	0	0	1083	0	0	399	0
Confl. Peds. (#/hr)	2		26	26		2	36		26	26		36
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)		13.4						76.6			76.6	
Effective Green, g (s)		15.4						78.6			78.6	
Actuated g/C Ratio		0.15						0.79			0.79	
Clearance Time (s)		5.0						5.0			5.0	
Vehicle Extension (s)		3.0						1.0			1.0	
Lane Grp Cap (vph)		214						2642			2759	
v/s Ratio Prot											0.11	
v/s Ratio Perm	c0.05							c0.32				
v/c Ratio	0.30							0.41			0.14	
Uniform Delay, d1	37.5							3.4			2.6	
Progression Factor	1.00							1.49			1.00	
Incremental Delay, d2	0.8							0.4			0.1	
Delay (s)	38.3							5.5			2.7	
Level of Service	D							A			A	
Approach Delay (s)	38.3			0.0				5.5			2.7	
Approach LOS	D			A				A			A	
<b>Intersection Summary</b>												
HCM Average Control Delay		6.6			HCM Level of Service			A				
HCM Volume to Capacity ratio		0.39										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			6.0				
Intersection Capacity Utilization		51.2%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Unsignalized Intersection Capacity Analysis

102: Alabama Ave & 8th St

9/29/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑	↑	↑	
Volume (veh/h)	30	475	670	510	0	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	528	744	567	0	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		363	121			
pX, platoon unblocked	0.89			0.89	0.89	
vC, conflicting volume	1311			1075	744	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1288			1024	654	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	93			100	95	
cM capacity (veh/h)	477			192	366	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	209	352	744	567	17	
Volume Left	33	0	0	0	0	
Volume Right	0	0	0	567	17	
cSH	477	1700	1700	1700	366	
Volume to Capacity	0.07	0.21	0.44	0.33	0.05	
Queue Length 95th (ft)	6	0	0	0	4	
Control Delay (s)	2.9	0.0	0.0	0.0	15.3	
Lane LOS	A			C		
Approach Delay (s)	1.1		0.0		15.3	
Approach LOS				C		
<b>Intersection Summary</b>						
Average Delay		0.5				
Intersection Capacity Utilization		52.2%		ICU Level of Service		A
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

376: M.L.King Ave & 4th St

9/29/2011

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↓			↑↓	↑	↑
Volume (veh/h)	650	10	45	415	10	225
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	722	11	50	461	11	250
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					5	
Median type	None		None			
Median storage veh)						
Upstream signal (ft)			209			
pX, platoon unblocked				0.99		
vC, conflicting volume		733		1058	367	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		733		1036	367	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		94		95	60	
cM capacity (veh/h)		867		212	630	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	481	252	204	307	261	
Volume Left	0	0	50	0	11	
Volume Right	0	11	0	0	250	
cSH	1700	1700	867	1700	658	
Volume to Capacity	0.28	0.15	0.06	0.18	0.40	
Queue Length 95th (ft)	0	0	5	0	47	
Control Delay (s)	0.0	0.0	2.8	0.0	14.8	
Lane LOS			A		B	
Approach Delay (s)	0.0		1.1		14.8	
Approach LOS					B	
<b>Intersection Summary</b>						
Average Delay		2.9				
Intersection Capacity Utilization		44.4%		ICU Level of Service		A
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

401: Malcolm X Aven & 7th Street

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	50	215	20	290	140	240	185	5	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	53	229	21	309	149	255	197	5	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total (vph)	298	479	457									
Volume Left (vph)	16	21	255									
Volume Right (vph)	229	149	5									
Hadj (s)	-0.42	-0.14	0.14									
Departure Headway (s)	5.9	5.9	6.2									
Degree Utilization, x	0.49	0.78	0.79									
Capacity (veh/h)	569	596	560									
Control Delay (s)	14.5	26.7	28.9									
Approach Delay (s)	14.5	26.7	28.9									
Approach LOS	B	D	D									
Intersection Summary												
Delay				24.6								
HCM Level of Service				C								
Intersection Capacity Utilization			60.5%		ICU Level of Service				B			
Analysis Period (min)			15									

# Existing PM

# HCM Unsignalized Intersection Capacity Analysis

21: Lebaum St & M.L.King Ave

9/29/2011

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	5	10	10	65	35	350	0	0	685	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	5	11	11	71	38	380	0	0	745	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								433			535	
pX, platoon unblocked	0.99	0.99	0.98	0.99	0.99	0.97	0.98				0.97	
vC, conflicting volume	1285	1209	380	834	1217	380	761				380	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1195	1117	319	737	1126	350	708				350	
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	95	100	99	96	94	89	96				100	
cM capacity (veh/h)	115	194	661	290	192	629	866				1174	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2							
Volume Total	11	92	418	496	264							
Volume Left	5	11	38	0	0							
Volume Right	5	71	0	0	16							
cSH	196	447	866	1700	1700							
Volume to Capacity	0.06	0.21	0.04	0.29	0.16							
Queue Length 95th (ft)	4	19	3	0	0							
Control Delay (s)	24.5	15.1	1.3	0.0	0.0							
Lane LOS	C	C	A									
Approach Delay (s)	24.5	15.1	1.3	0.0								
Approach LOS	C	C										
<b>Intersection Summary</b>												
Average Delay			1.7									
Intersection Capacity Utilization		54.9%		ICU Level of Service				A				
Analysis Period (min)		15										

# HCM Signalized Intersection Capacity Analysis

26: Malcolm X Aven & M.L.King Ave

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	315	120	15	245	55	175	270	25	210	440	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	3.0		2.0			2.0	3.0		2.0	
Lane Util. Factor		1.00	1.00		1.00			1.00	1.00		0.95	
Frpb, ped/bikes		1.00	0.97		0.97			1.00	0.69		0.98	
Flpb, ped/bikes		0.99	1.00		1.00			0.99	1.00		0.95	
Fr <sub>t</sub>		1.00	0.85		0.98			1.00	0.85		0.99	
Flt Protected		0.99	1.00		1.00			0.98	1.00		0.99	
Satd. Flow (prot)		1829	1538		1755			1810	1086		3221	
Flt Permitted		0.83	1.00		0.91			0.45	1.00		0.69	
Satd. Flow (perm)		1528	1538		1608			838	1086		2257	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	67	350	133	17	272	61	194	300	28	233	489	56
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	417	133	0	350	0	0	494	28	0	778	0
Confl. Peds. (#/hr)	71		12	12		71	99		102	102		99
Turn Type	Perm		Perm	Perm			pm+pt		Perm	Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	31.0	31.0		31.0			61.0	61.0			49.0	
Effective Green, g (s)	33.0	32.0		33.0			63.0	62.0			51.0	
Actuated g/C Ratio	0.33	0.32		0.33			0.63	0.62			0.51	
Clearance Time (s)	4.0	4.0		4.0			4.0	4.0			4.0	
Lane Grp Cap (vph)	504	492		531			625	673			1151	
v/s Ratio Prot							c0.08					
v/s Ratio Perm	c0.27	0.09		0.22			0.42	0.03			c0.34	
v/c Ratio	0.83	0.27		0.66			0.79	0.04			0.68	
Uniform Delay, d1	30.9	25.3		28.7			13.6	7.4			18.3	
Progression Factor	1.67	1.69		1.00			3.76	2.49			0.70	
Incremental Delay, d2	13.8	1.3		6.3			8.9	0.1			3.1	
Delay (s)	65.5	44.2		35.0			60.2	18.6			15.9	
Level of Service	E	D		C			E	B			B	
Approach Delay (s)	60.3			35.0			57.9				15.9	
Approach LOS	E			C			E				B	
<b>Intersection Summary</b>												
HCM Average Control Delay	40.0				HCM Level of Service			D				
HCM Volume to Capacity ratio	0.73											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)			6.0				
Intersection Capacity Utilization	93.8%				ICU Level of Service			F				
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

27: Raleigh PI & M.L.King Ave

9/29/2011

Movement	WBL	WBR	NBL	NBR	NET	NER	NER2	SWL	SWT
Lane Configurations	Y		Y		↑↑			Y	↑
Volume (vph)	10	20	10	25	425	0	20	135	440
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0		3.0			2.0	3.0
Lane Util. Factor	1.00		1.00		0.95			1.00	1.00
Frpb, ped/bikes	1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes	1.00		0.99		1.00			1.00	1.00
Fr <sub>t</sub>	0.91		0.90		0.99			1.00	1.00
Flt Protected	0.98		0.99		1.00			0.95	1.00
Satd. Flow (prot)	1667		1649		3509			1770	1863
Flt Permitted	0.98		0.93		1.00			0.31	1.00
Satd. Flow (perm)	1667		1557		3509			575	1863
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	22	11	28	472	0	22	150	489
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	33	0	39	0	490	0	0	150	489
Confl. Peds. (#/hr)				16				6	
Turn Type								pm+pt	
Protected Phases	8				2			1	2
Permitted Phases			1					2	
Actuated Green, G (s)	36.0		26.0		25.0			51.0	25.0
Effective Green, g (s)	37.0		27.0		27.0			55.0	27.0
Actuated g/C Ratio	0.37		0.27		0.27			0.55	0.27
Clearance Time (s)	4.0		4.0		5.0			4.0	5.0
Vehicle Extension (s)	3.0		1.0		1.0			1.0	1.0
Lane Grp Cap (vph)	617		420		947			651	503
v/s Ratio Prot	c0.02				0.14			c0.06	c0.26
v/s Ratio Perm			0.03					0.06	
v/c Ratio	0.05		0.09		0.52			0.23	0.97
Uniform Delay, d1	20.2		27.3		31.0			11.6	36.1
Progression Factor	1.00		1.10		0.84			0.87	0.91
Incremental Delay, d2	0.2		0.4		0.2			0.1	28.9
Delay (s)	20.4		30.5		26.4			10.2	61.9
Level of Service	C		C		C			B	E
Approach Delay (s)	20.4		30.5		26.4			49.7	
Approach LOS	C		C		C			D	
Intersection Summary									
HCM Average Control Delay		38.7			HCM Level of Service			D	
HCM Volume to Capacity ratio		0.38							
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			8.0	
Intersection Capacity Utilization		44.9%			ICU Level of Service			A	
Analysis Period (min)		15							
c Critical Lane Group									

# HCM Signalized Intersection Capacity Analysis

29: Alabama Ave & Randle Pl

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	5	5	320	25	5	5	5	105	5	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0			5.0	
Lane Util. Factor		0.95			1.00	1.00		1.00			1.00	
Frpb, ped/bikes		1.00			1.00	0.55		1.00			0.87	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Fr <sub>t</sub>		1.00			1.00	0.85		0.95			0.96	
Flt Protected		1.00			1.00	1.00		0.98			0.97	
Satd. Flow (prot)		3503			1859	875		1750			1506	
Flt Permitted		0.95			0.99	1.00		0.98			0.97	
Satd. Flow (perm)		3328			1851	875		1750			1506	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	6	311	6	6	356	28	6	6	6	117	6	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	323	0	0	362	28	0	18	0	0	173	0
Confl. Peds. (#/hr)	96		27	27		96						114
Turn Type	Perm		Perm		Perm		Split		Split			
Protected Phases		2			6		7	7		8	8	
Permitted Phases	2			6		6						
Actuated Green, G (s)	63.3			63.3	63.3		2.8			15.9		
Effective Green, g (s)	64.3			64.3	64.3		3.8			16.9		
Actuated g/C Ratio	0.64			0.64	0.64		0.04			0.17		
Clearance Time (s)	6.0			6.0	6.0		6.0			6.0		
Vehicle Extension (s)	1.0			1.0	1.0		3.0			3.0		
Lane Grp Cap (vph)	2140			1190	563		67			255		
v/s Ratio Prot							c0.01			c0.11		
v/s Ratio Perm	0.10			c0.20	0.03							
v/c Ratio	0.15			0.30	0.05		0.27			0.68		
Uniform Delay, d1	7.1			7.9	6.6		46.7			39.0		
Progression Factor	2.39			0.94	0.97		1.00			0.51		
Incremental Delay, d2	0.1			0.6	0.2		2.2			6.8		
Delay (s)	17.0			8.1	6.6		48.9			26.6		
Level of Service	B			A	A		D			C		
Approach Delay (s)	17.0			8.0			48.9			26.6		
Approach LOS	B			A			D			C		
<b>Intersection Summary</b>												
HCM Average Control Delay	15.6				HCM Level of Service					B		
HCM Volume to Capacity ratio	0.38											
Actuated Cycle Length (s)	100.0				Sum of lost time (s)					15.0		
Intersection Capacity Utilization	46.5%				ICU Level of Service					A		
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

30: Alabama Ave & Wheeler Rd

9/29/2011

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↖	↙	↖↑	↖	↖
Volume (vph)	520	305	125	465	160	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	4.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Flt Protected	1.00	1.00		0.99	0.95	1.00
Satd. Flow (prot)	1863	1583		3502	1770	1583
Flt Permitted	1.00	1.00		0.62	0.95	1.00
Satd. Flow (perm)	1863	1583		2192	1770	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	578	339	139	517	178	83
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	578	339	0	656	178	83
Turn Type	custom	pm+pt		pt+ov		
Protected Phases	4 5	2 5	3	8	2	2 3
Permitted Phases			8			
Actuated Green, G (s)	65.0	35.0		85.0	25.0	45.0
Effective Green, g (s)	67.0	36.0		87.0	27.0	47.0
Actuated g/C Ratio	0.56	0.30		0.72	0.22	0.39
Clearance Time (s)				5.0	5.0	
Lane Grp Cap (vph)	1040	475		1775	398	620
v/s Ratio Prot	c0.31	c0.21		c0.05	0.10	0.05
v/s Ratio Perm			0.22			
v/c Ratio	0.56	0.71		0.37	0.45	0.13
Uniform Delay, d1	17.0	37.4		6.2	40.1	23.4
Progression Factor	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.1	8.8		0.6	3.6	0.4
Delay (s)	19.1	46.2		6.8	43.7	23.9
Level of Service	B	D		A	D	C
Approach Delay (s)	29.1			6.8	37.4	
Approach LOS	C			A	D	
<b>Intersection Summary</b>						
HCM Average Control Delay	22.3		HCM Level of Service		C	
HCM Volume to Capacity ratio	0.58					
Actuated Cycle Length (s)	120.0		Sum of lost time (s)		9.0	
Intersection Capacity Utilization	62.7%		ICU Level of Service		B	
Analysis Period (min)	15					
c Critical Lane Group						

# HCM Signalized Intersection Capacity Analysis

31: Alabama Ave & 11th Pl

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (vph)	15	555	25	10	475	5	10	5	25	35	10	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0			3.0			3.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.99			1.00			1.00			0.97	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Fr <sub>t</sub>		0.99			1.00			0.92			0.91	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		1836			1854			1679			1609	
Flt Permitted		0.98			0.99			0.83			0.93	
Satd. Flow (perm)		1809			1832			1413			1517	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	17	617	28	11	528	6	11	6	28	39	11	117
RTOR Reduction (vph)	0	1	0	0	0	0	0	25	0	0	95	0
Lane Group Flow (vph)	0	661	0	0	545	0	0	21	0	0	73	0
Confl. Peds. (#/hr)	31		35	35		31	9					9
Turn Type	Perm				Perm			Perm			Perm	
Protected Phases		2			2			4			4	
Permitted Phases	2				2			4			4	
Actuated Green, G (s)		79.5			79.5			10.5			10.5	
Effective Green, g (s)		81.5			81.5			12.5			12.5	
Actuated g/C Ratio		0.82			0.82			0.12			0.12	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		1.0			1.0			3.0			3.0	
Lane Grp Cap (vph)		1474			1493			177			190	
v/s Ratio Prot												
v/s Ratio Perm		c0.37			0.30			0.01			c0.05	
v/c Ratio		0.45			0.36			0.12			0.38	
Uniform Delay, d1		2.7			2.4			38.8			40.2	
Progression Factor		1.00			2.94			1.00			1.00	
Incremental Delay, d2		1.0			0.6			0.3			1.3	
Delay (s)		3.7			7.8			39.1			41.5	
Level of Service		A			A			D			D	
Approach Delay (s)		3.7			7.8			39.1			41.5	
Approach LOS		A			A			D			D	
<b>Intersection Summary</b>												
HCM Average Control Delay		10.8			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			6.0				
Intersection Capacity Utilization		57.5%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

32: Alabama Ave & WMATA Drive

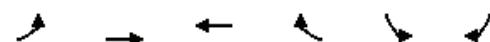
9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑↑			↔		↑	↑	↑
Volume (vph)	50	545	20	50	465	45	10	10	40	35	10	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0	3.5	3.0			3.5		3.5	3.5	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			0.93		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00		0.92	1.00	1.00
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.99			0.91		1.00	1.00	0.85
Fl <sub>t</sub> Protected	0.95	1.00	1.00	0.95	1.00			0.99		0.95	1.00	1.00
Satd. Flow (prot)	1767	1863	1531	1770	3483			1557		1630	1863	1532
Fl <sub>t</sub> Permitted	0.34	1.00	1.00	0.12	1.00			0.97		0.74	1.00	1.00
Satd. Flow (perm)	630	1863	1531	233	3483			1528		1276	1863	1532
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	606	22	56	517	50	11	11	44	39	11	17
RTOR Reduction (vph)	0	0	5	0	7	0	0	26	0	0	0	10
Lane Group Flow (vph)	56	606	17	56	560	0	0	40	0	39	11	7
Confl. Peds. (#/hr)	5		4	4		5	25		63	63		25
Turn Type	pm+pt		Perm	pm+pt			Perm			Perm		Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4			8		8
Actuated Green, G (s)	46.0	38.0	38.0	46.0	38.0			40.0		40.0	40.0	40.0
Effective Green, g (s)	48.0	40.0	39.0	47.0	40.0			41.5		41.5	41.5	41.0
Actuated g/C Ratio	0.48	0.40	0.39	0.47	0.40			0.42		0.42	0.42	0.41
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0			5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	405	745	597	240	1393			634		530	773	628
v/s Ratio Prot	0.01	c0.33		c0.02	0.16						0.01	
v/s Ratio Perm	0.05		0.01	0.09				0.03		c0.03		0.00
v/c Ratio	0.14	0.81	0.03	0.23	0.40			0.06		0.07	0.01	0.01
Uniform Delay, d1	14.4	26.7	18.8	18.6	21.4			17.6		17.7	17.2	17.5
Progression Factor	0.98	1.07	1.02	0.82	1.05			1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	8.8	0.1	2.2	0.8			0.2		0.3	0.0	0.0
Delay (s)	14.7	37.3	19.3	17.5	23.3			17.8		17.9	17.2	17.5
Level of Service	B	D	B	B	C			B		B	B	B
Approach Delay (s)		34.8			22.8			17.8			17.7	
Approach LOS		C			C			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay		28.0			HCM Level of Service			C				
HCM Volume to Capacity ratio		0.42										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		89.2%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

45: Alabama Ave & 7th St

9/29/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑	↑	↑	
Volume (vph)	15	375	340	130	340	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	4.0	3.0	
Lane Util. Factor		0.95	1.00	1.00	1.00	
Frpb, ped/bikes		1.00	1.00	0.94	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	
Fr <sub>t</sub>		1.00	1.00	0.85	1.00	
Flt Protected		1.00	1.00	1.00	0.95	
Satd. Flow (prot)		3529	1863	1490	1770	
Flt Permitted		0.94	1.00	1.00	0.95	
Satd. Flow (perm)		3310	1863	1490	1770	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	17	417	378	144	378	11
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	434	378	144	389	0
Confl. Peds. (#/hr)	19			19	6	
Turn Type	Perm		Perm			
Protected Phases		2	2		4	
Permitted Phases	2			2		
Actuated Green, G (s)		65.2	65.2	65.2	24.8	
Effective Green, g (s)		67.2	67.2	66.2	26.8	
Actuated g/C Ratio		0.67	0.67	0.66	0.27	
Clearance Time (s)		5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		2224	1252	986	474	
v/s Ratio Prot		c0.20		c0.22		
v/s Ratio Perm		0.13		0.10		
v/c Ratio		0.20	0.30	0.15	0.82	
Uniform Delay, d1		6.2	6.7	6.3	34.3	
Progression Factor		1.87	1.00	1.00	1.00	
Incremental Delay, d2		0.2	0.6	0.3	10.9	
Delay (s)		11.8	7.4	6.6	45.2	
Level of Service		B	A	A	D	
Approach Delay (s)		11.8	7.2		45.2	
Approach LOS		B	A		D	
<b>Intersection Summary</b>						
HCM Average Control Delay		19.7		HCM Level of Service		B
HCM Volume to Capacity ratio		0.45				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		47.4%		ICU Level of Service		A
Analysis Period (min)		15				

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

46: Eliz Gate 4 & M.L.King Ave

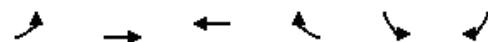
9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	0	10	0	0	0	10	410	0	0	690	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.0					3.0			3.0	
Lane Util. Factor		1.00						1.00			0.95	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		0.99						1.00			1.00	
Fr <sub>t</sub>		0.95						1.00			1.00	
Flt Protected		0.97						1.00			1.00	
Satd. Flow (prot)		1687						1858			3529	
Flt Permitted		0.85						0.98			1.00	
Satd. Flow (perm)		1485						1826			3529	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	0	11	0	0	0	11	456	0	0	767	6
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	24	0	0	0	0	0	467	0	0	773	0
Confl. Peds. (#/hr)	5		11	11		5	50		5	5		50
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases		4		4			2			2		
Permitted Phases	4		4		2			2				
Actuated Green, G (s)		13.0					77.0				77.0	
Effective Green, g (s)		15.0					79.0				79.0	
Actuated g/C Ratio		0.15					0.79				0.79	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					1.0				1.0	
Lane Grp Cap (vph)		223					1443				2788	
v/s Ratio Prot											0.22	
v/s Ratio Perm	c0.02						c0.26					
v/c Ratio	0.11						0.32				0.28	
Uniform Delay, d1	36.7						3.0				2.8	
Progression Factor	1.00						2.12				0.26	
Incremental Delay, d2	0.2						0.5				0.2	
Delay (s)	36.9						6.7				1.0	
Level of Service	D						A				A	
Approach Delay (s)	36.9			0.0			6.7				1.0	
Approach LOS	D			A			A				A	
<b>Intersection Summary</b>												
HCM Average Control Delay		4.0		HCM Level of Service			A					
HCM Volume to Capacity ratio		0.29										
Actuated Cycle Length (s)		100.0		Sum of lost time (s)			6.0					
Intersection Capacity Utilization		47.1%		ICU Level of Service			A					
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Unsignalized Intersection Capacity Analysis

102: Alabama Ave & 8th St

9/29/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	
Volume (veh/h)	10	705	460	165	115	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	11	783	511	183	128	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		363	121			
pX, platoon unblocked	0.95			0.96	0.95	
vC, conflicting volume	694			1017	347	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	568			834	202	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	99			56	99	
cM capacity (veh/h)	948			290	763	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	272	522	341	354	139	
Volume Left	11	0	0	0	128	
Volume Right	0	0	0	183	11	
cSH	948	1700	1700	1700	305	
Volume to Capacity	0.01	0.31	0.20	0.21	0.45	
Queue Length 95th (ft)	1	0	0	0	56	
Control Delay (s)	0.5	0.0	0.0	0.0	26.2	
Lane LOS	A			D		
Approach Delay (s)	0.2		0.0	26.2		
Approach LOS				D		
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		40.2%		ICU Level of Service		A
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

376: M.L.King Ave & 4th St

9/29/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↓			↑↑	↖	↗
Volume (veh/h)	435	20	105	570	20	150
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	483	22	117	633	22	167
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					5	
Median type	None		None			
Median storage veh)						
Upstream signal (ft)			209			
pX, platoon unblocked				0.95		
vC, conflicting volume		506		1044	253	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		506		946	253	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		89		90	78	
cM capacity (veh/h)		1055		220	747	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	322	183	328	422	189	
Volume Left	0	0	117	0	22	
Volume Right	0	22	0	0	167	
cSH	1700	1700	1055	1700	846	
Volume to Capacity	0.19	0.11	0.11	0.25	0.22	
Queue Length 95th (ft)	0	0	9	0	21	
Control Delay (s)	0.0	0.0	3.9	0.0	12.6	
Lane LOS			A		B	
Approach Delay (s)	0.0		1.7		12.6	
Approach LOS					B	
<b>Intersection Summary</b>						
Average Delay		2.5				
Intersection Capacity Utilization		44.8%		ICU Level of Service		A
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

401: Malcolm X Aven & 7th St

9/29/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	180	345	5	215	45	105	35	5	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	191	367	5	229	48	112	37	5	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total (vph)	585	282	154									
Volume Left (vph)	27	5	112									
Volume Right (vph)	367	48	5									
Hadj (s)	-0.33	-0.06	0.16									
Departure Headway (s)	4.4	5.0	6.0									
Degree Utilization, x	0.72	0.39	0.26									
Capacity (veh/h)	585	682	531									
Control Delay (s)	18.0	11.2	11.1									
Approach Delay (s)	18.0	11.2	11.1									
Approach LOS	C	B	B									
Intersection Summary												
Delay												
HCM Level of Service												
Intersection Capacity Utilization					59.7%							
Analysis Period (min)							ICU Level of Service					
							B					

# No Build AM

HCM Signalized Intersection Capacity Analysis  
26: Malcolm X Ave & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	230	155	5	505	95	345	1060	15	85	240	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0			3.0		4.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93			0.98		1.00	0.99		1.00	0.91	
Flpb, ped/bikes	0.99	1.00			1.00		0.96	1.00		1.00	1.00	
Fr <sub>t</sub>	1.00	0.85			0.98		1.00	1.00		1.00	0.95	
Fl <sub>t</sub> Protected	0.98	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1639	1331			1679		1708	3506		1687	2909	
Fl <sub>t</sub> Permitted	0.55	1.00			1.00		0.33	1.00		0.17	1.00	
Satd. Flow (perm)	920	1331			1675		601	3506		309	2909	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	144	245	165	5	537	101	367	1128	16	90	255	128
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	389	165	0	643	0	367	1144	0	90	383	0
Confl. Peds. (#/hr)	64		70	70		64	116		134	134		116
Heavy Vehicles (%)	13%	13%	13%	9%	9%	9%	2%	2%	2%	7%	7%	7%
Turn Type	pm+pt		pm+ov		Perm		pm+pt		pm+pt		pm+pt	
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	42.0	54.0			42.0		38.0	28.2		25.8	21.0	
Effective Green, g (s)	44.0	56.0			44.0		39.0	30.2		29.8	23.0	
Actuated g/C Ratio	0.49	0.62			0.49		0.43	0.34		0.33	0.26	
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	450	887			819		420	1176		206	743	
v/s Ratio Prot		0.03				c0.13	c0.33			0.03	0.13	
v/s Ratio Perm	c0.42	0.10			0.38		0.25			0.11		
v/c Ratio	0.86	0.19			0.79		0.87	0.97		0.44	0.52	
Uniform Delay, d1	20.4	7.3			19.1		19.8	29.5		23.4	28.7	
Progression Factor	1.00	1.00			1.00		1.09	0.67		0.74	0.84	
Incremental Delay, d2	15.7	0.1			5.0		13.7	16.7		1.5	2.5	
Delay (s)	36.1	7.4			24.1		35.3	36.5		18.7	26.7	
Level of Service	D	A			C		D	D		B	C	
Approach Delay (s)	27.5				24.1			36.2			25.2	
Approach LOS	C				C			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay	30.6				HCM Level of Service					C		
HCM Volume to Capacity ratio	0.90											
Actuated Cycle Length (s)	90.0				Sum of lost time (s)					7.0		
Intersection Capacity Utilization	102.4%				ICU Level of Service					G		
Analysis Period (min)	15											
c Critical Lane Group												

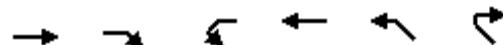
HCM Signalized Intersection Capacity Analysis  
27: Raleigh PI & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	WBL	WBR	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations								
Volume (vph)	15	105	25	225	1090	0	45	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		3.0		3.0	3.0
Lane Util. Factor	1.00		1.00		0.95		1.00	0.95
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Frt	0.88		0.88		1.00		1.00	1.00
Flt Protected	0.99		0.99		1.00		0.95	1.00
Satd. Flow (prot)	1571		1645		3505		1671	3343
Flt Permitted	0.99		0.99		1.00		0.12	1.00
Satd. Flow (perm)	1571		1645		3505		210	3343
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	112	27	239	1160	0	48	378
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	128	0	266	0	1160	0	48	378
Confl. Peds. (#/hr)			26					
Heavy Vehicles (%)	6%	6%	1%	1%	3%	3%	8%	8%
Turn Type							D.P+P	
Protected Phases	8		4		2		1	6
Permitted Phases							2	
Actuated Green, G (s)	9.3		16.9		40.2		43.8	48.8
Effective Green, g (s)	10.3		17.9		42.2		47.8	50.8
Actuated g/C Ratio	0.11		0.20		0.47		0.53	0.56
Clearance Time (s)	5.0		5.0		5.0		5.0	5.0
Vehicle Extension (s)	3.0		1.0		1.0		1.0	1.0
Lane Grp Cap (vph)	180		327		1643		202	1887
v/s Ratio Prot	c0.08		c0.16		c0.33		c0.01	0.11
v/s Ratio Perm							0.11	
v/c Ratio	0.71		0.81		0.71		0.24	0.20
Uniform Delay, d1	38.4		34.5		19.0		13.1	9.6
Progression Factor	1.00		1.06		0.75		1.61	1.10
Incremental Delay, d2	12.4		13.4		2.4		0.2	0.2
Delay (s)	50.9		49.8		16.5		21.3	10.8
Level of Service	D		D		B		C	B
Approach Delay (s)	50.9		49.8		16.5			12.0
Approach LOS	D		D		B			B
Intersection Summary								
HCM Average Control Delay		22.2		HCM Level of Service			C	
HCM Volume to Capacity ratio		0.70						
Actuated Cycle Length (s)		90.0		Sum of lost time (s)			14.0	
Intersection Capacity Utilization		70.0%		ICU Level of Service			C	
Analysis Period (min)		15						
c Critical Lane Group								

HCM Signalized Intersection Capacity Analysis  
28: Martin Luther King Jr Ave & Alabama Ave

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (vph)	930	65	50	345	80	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	5.0
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00		0.99	1.00	1.00	1.00
Fr <sub>t</sub>	0.99		1.00	1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3496		1760	3539	3433	1541
Fl <sub>t</sub> Permitted	1.00		0.24	1.00	0.95	1.00
Satd. Flow (perm)	3496		438	3539	3433	1541
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	989	69	53	367	85	176
RTOR Reduction (vph)	7	0	0	0	0	22
Lane Group Flow (vph)	1051	0	53	367	85	154
Confl. Peds. (#/hr)		20	20		20	20
Turn Type			Perm		Perm	
Protected Phases	2			6	4	
Permitted Phases			6		4	
Actuated Green, G (s)	26.4		26.4	26.4	8.6	8.6
Effective Green, g (s)	26.4		26.4	26.4	8.6	8.6
Actuated g/C Ratio	0.59		0.59	0.59	0.19	0.19
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2051		257	2076	656	295
v/s Ratio Prot	c0.30			0.10	0.02	
v/s Ratio Perm			0.12		c0.10	
v/c Ratio	0.51		0.21	0.18	0.13	0.52
Uniform Delay, d <sub>1</sub>	5.5		4.4	4.3	15.1	16.4
Progression Factor	0.88		0.90	0.77	0.78	0.81
Incremental Delay, d <sub>2</sub>	0.9		1.8	0.2	0.1	1.7
Delay (s)	5.7		5.7	3.5	11.9	14.9
Level of Service	A		A	A	B	B
Approach Delay (s)	5.7			3.8	13.9	
Approach LOS	A			A	B	
Intersection Summary						
HCM Average Control Delay		6.5		HCM Level of Service		A
HCM Volume to Capacity ratio		0.51				
Actuated Cycle Length (s)		45.0		Sum of lost time (s)		10.0
Intersection Capacity Utilization		55.3%		ICU Level of Service		B
Analysis Period (min)		15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
46: Cypress St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	0	75	70	0	60	10	1320	260	150	295	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00			1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	0.94			1.00	0.98		1.00	0.95		1.00	0.99	
Flpb, ped/bikes	1.00			0.95	1.00		0.77	1.00		1.00	1.00	
Fr <sub>t</sub>	0.91			1.00	0.85		1.00	0.98		1.00	1.00	
Fl <sub>t</sub> Protected	0.98			0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1586			1712	1587		1334	3232		1687	3346	
Fl <sub>t</sub> Permitted	0.90			0.64	1.00		0.56	1.00		0.09	1.00	
Satd. Flow (perm)	1457			1148	1587		784	3232		157	3346	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	37	0	80	74	0	64	11	1404	277	160	314	5
RTOR Reduction (vph)	0	60	0	0	44	0	0	18	0	0	1	0
Lane Group Flow (vph)	0	57	0	74	20	0	11	1663	0	160	318	0
Confl. Peds. (#/hr)	4			52	52		4	72		52	52	72
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	4%	4%	4%	7%	7%	7%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	20.0			20.0	20.0		60.0	60.0		60.0	60.0	
Effective Green, g (s)	22.0			22.0	22.0		62.0	62.0		62.0	62.0	
Actuated g/C Ratio	0.24			0.24	0.24		0.69	0.69		0.69	0.69	
Clearance Time (s)	5.0			5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	356			281	388		540	2226		108	2305	
v/s Ratio Prot					0.01			0.51			0.09	
v/s Ratio Perm	0.04			c0.06			0.01			c1.02		
v/c Ratio	0.16			0.26	0.05		0.02	0.75		1.48	0.14	
Uniform Delay, d1	26.7			27.5	26.0		4.4	9.0		14.0	4.8	
Progression Factor	1.00			1.00	1.00		0.47	0.56		1.43	0.38	
Incremental Delay, d2	0.2			0.5	0.1		0.0	1.6		259.2	0.1	
Delay (s)	26.9			28.0	26.1		2.1	6.7		279.2	1.9	
Level of Service	C			C	C		A	A		F	A	
Approach Delay (s)	26.9				27.1			6.6			94.6	
Approach LOS	C				C			A			F	
<b>Intersection Summary</b>												
HCM Average Control Delay	26.1			HCM Level of Service			C					
HCM Volume to Capacity ratio	1.16											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			6.0					
Intersection Capacity Utilization	88.8%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
48: Pecan St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↑	↑	↑↑		↑	↑↑
Volume (vph)	70	80	1365	50	230	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fr <sub>t</sub>	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1599	3453		1612	3223
Flt Permitted	0.95	1.00	1.00		0.09	1.00
Satd. Flow (perm)	1787	1599	3453		152	3223
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	85	1452	53	245	404
RTOR Reduction (vph)	0	11	3	0	0	0
Lane Group Flow (vph)	74	74	1502	0	245	404
Heavy Vehicles (%)	1%	1%	4%	4%	12%	12%
Turn Type	pm+ov			D.P+P		
Protected Phases	3	1	2		1	1 2
Permitted Phases		3	2		2	
Actuated Green, G (s)	18.0	30.5	44.5		57.0	62.0
Effective Green, g (s)	18.0	30.5	44.5		57.0	62.0
Actuated g/C Ratio	0.20	0.34	0.49		0.63	0.69
Clearance Time (s)	5.0	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	357	631	1707		299	2220
v/s Ratio Prot	c0.04	0.02	c0.44		c0.11	0.13
v/s Ratio Perm		0.03			0.40	
v/c Ratio	0.21	0.12	0.88		0.82	0.18
Uniform Delay, d1	30.0	20.5	20.4		23.6	5.0
Progression Factor	1.00	1.00	0.41		0.34	0.27
Incremental Delay, d2	1.3	0.1	4.9		14.8	0.0
Delay (s)	31.4	20.6	13.2		22.8	1.4
Level of Service	C	C	B		C	A
Approach Delay (s)	25.6		13.2			9.5
Approach LOS	C		B			A
<b>Intersection Summary</b>						
HCM Average Control Delay		13.0		HCM Level of Service		B
HCM Volume to Capacity ratio		0.71				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		15.0
Intersection Capacity Utilization		68.4%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

## HCM Signalized Intersection Capacity Analysis

29: Alabama Ave &amp; Randle Pl

CH2M HILL

12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	50	25	5	240	195	0	15	5	35	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0	5.0		5.0			5.0	
Lane Util. Factor	0.95				1.00	1.00		1.00			1.00	
Frpb, ped/bikes	0.91				1.00	0.53		0.99			0.98	
Flpb, ped/bikes	0.89				0.99	1.00		1.00			1.00	
Fr <sub>t</sub>	0.97				1.00	0.85		0.97			0.99	
Flt Protected	0.98				1.00	1.00		1.00			0.96	
Satd. Flow (prot)	2778				1886	855		1817			1642	
Flt Permitted	0.82				1.00	1.00		1.00			0.96	
Satd. Flow (perm)	2314				1882	855		1817			1642	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	43	53	27	5	255	207	0	16	5	37	5	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	123	0	0	260	207	0	21	0	0	47	0
Confl. Peds. (#/hr)	92		78	78		92	126		6	6		126
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	7%	7%	7%	7%
Turn Type	Perm		Perm		Perm		Split			Split		
Protected Phases		2			6		7	7		8	8	
Permitted Phases	2			6		6						
Actuated Green, G (s)	63.3			63.3	63.3		3.1			5.6		
Effective Green, g (s)	64.3			64.3	64.3		4.1			6.6		
Actuated g/C Ratio	0.71			0.71	0.71		0.05			0.07		
Clearance Time (s)	6.0			6.0	6.0		6.0			6.0		
Vehicle Extension (s)	1.0			1.0	1.0		3.0			3.0		
Lane Grp Cap (vph)	1653			1345	611		83			120		
v/s Ratio Prot						c0.01				c0.03		
v/s Ratio Perm	0.05			0.14	c0.24							
v/c Ratio	0.07			0.19	0.34		0.25			0.39		
Uniform Delay, d1	3.9			4.3	4.8		41.5			39.8		
Progression Factor	0.38			0.90	0.79		1.00			0.77		
Incremental Delay, d2	0.1			0.1	0.7		1.6			2.1		
Delay (s)	1.5			4.0	4.5		43.1			32.6		
Level of Service	A			A	A		D			C		
Approach Delay (s)	1.5			4.2			43.1			32.6		
Approach LOS	A			A			D			C		
<b>Intersection Summary</b>												
HCM Average Control Delay	7.0		HCM Level of Service				A					
HCM Volume to Capacity ratio	0.34											
Actuated Cycle Length (s)	90.0		Sum of lost time (s)				15.0					
Intersection Capacity Utilization	45.4%		ICU Level of Service				A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
30: Alabama Ave & Wheeler Rd

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖↑	↖	↗
Volume (vph)	215	120	15	505	825	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	1845	1568		2951	1752	1568
Fl <sub>t</sub> Permitted	1.00	1.00		0.95	0.95	1.00
Satd. Flow (perm)	1845	1568		2801	1752	1568
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	229	128	16	537	878	48
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	229	128	0	553	878	48
Confl. Peds. (#/hr)		32	32		2	8
Heavy Vehicles (%)	3%	3%	22%	22%	3%	3%
Turn Type	custom	pm+pt			pt+ov	
Protected Phases	4 5	2 5	3	8	2	2 3
Permitted Phases			8			
Actuated Green, G (s)	24.0	54.0		35.0	45.0	56.0
Effective Green, g (s)	26.0	55.0		37.0	47.0	58.0
Actuated g/C Ratio	0.29	0.61		0.41	0.52	0.64
Clearance Time (s)				5.0	5.0	
Lane Grp Cap (vph)	533	958		1165	915	1010
v/s Ratio Prot	0.12	0.08		c0.04	c0.50	0.03
v/s Ratio Perm				c0.15		
v/c Ratio	0.43	0.13		0.47	0.96	0.05
Uniform Delay, d <sub>1</sub>	26.0	7.4		19.4	20.6	5.9
Progression Factor	1.67	0.19		1.00	1.00	1.00
Incremental Delay, d <sub>2</sub>	1.9	0.2		1.4	21.4	0.1
Delay (s)	45.4	1.7		20.8	42.0	6.0
Level of Service	D	A		C	D	A
Approach Delay (s)	29.7			20.8	40.2	
Approach LOS	C			C	D	
<b>Intersection Summary</b>						
HCM Average Control Delay		32.3		HCM Level of Service		C
HCM Volume to Capacity ratio		0.75				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		77.2%		ICU Level of Service		D
Analysis Period (min)		15				

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

31: Alabama Ave & 11th Pl

CH2M HILL

12/8/2011

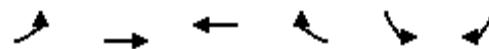


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	260	10	10	435	165	20	0	35	35	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0			2.0			4.0			4.0	
Lane Util. Factor	0.95				0.95			1.00			1.00	
Frpb, ped/bikes	0.99				1.00			0.99			1.00	
Flpb, ped/bikes	1.00				1.00			1.00			1.00	
Fr <sub>t</sub>	0.99				0.96			0.91			0.95	
Flt Protected	1.00				1.00			0.98			0.98	
Satd. Flow (prot)	3222				2889			1630			1730	
Flt Permitted	0.87				0.95			0.89			0.88	
Satd. Flow (perm)	2832				2746			1473			1557	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	277	11	11	463	176	21	0	37	37	11	27
RTOR Reduction (vph)	0	1	0	0	22	0	0	34	0	0	25	0
Lane Group Flow (vph)	0	319	0	0	628	0	0	24	0	0	50	0
Confl. Peds. (#/hr)			80	80			10		4			
Heavy Vehicles (%)	2%	11%	11%	26%	26%	2%	3%	2%	3%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	64.9			64.9			7.1			7.1		
Effective Green, g (s)	66.9			66.9			7.1			7.1		
Actuated g/C Ratio	0.84			0.84			0.09			0.09		
Clearance Time (s)	4.0			4.0			4.0			4.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	2368			2296			131			138		
v/s Ratio Prot												
v/s Ratio Perm	0.11			c0.23			0.02			c0.03		
v/c Ratio	0.13			0.27			0.19			0.37		
Uniform Delay, d1	1.2			1.4			33.8			34.3		
Progression Factor	1.00			1.00			1.00			1.00		
Incremental Delay, d2	0.1			0.3			0.7			1.6		
Delay (s)	1.3			1.7			34.5			36.0		
Level of Service	A			A			C			D		
Approach Delay (s)	1.3			1.7			34.5			36.0		
Approach LOS	A			A			C			D		
<b>Intersection Summary</b>												
HCM Average Control Delay	5.6			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.28											
Actuated Cycle Length (s)	80.0			Sum of lost time (s)			6.0					
Intersection Capacity Utilization	43.8%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
32: Alabama Ave & WMATA Driveway

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑↑			↔		↑	↑	
Volume (vph)	45	260	15	10	550	50	30	15	65	60	10	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	3.0	4.0	3.5	3.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.70	1.00	1.00			0.94		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	0.89	1.00			0.92		1.00	1.00	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.99			0.92		1.00	0.88	
Fl <sub>t</sub> Protected	0.95	1.00	1.00	0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1641	1727	1032	1423	3155			1402		1719	1600	
Fl <sub>t</sub> Permitted	0.37	1.00	1.00	0.59	1.00			0.89		0.58	1.00	
Satd. Flow (perm)	638	1727	1032	883	3155			1266		1047	1600	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	277	16	11	585	53	32	16	69	64	11	37
RTOR Reduction (vph)	0	0	4	0	4	0	0	62	0	0	33	0
Lane Group Flow (vph)	48	277	12	11	634	0	0	55	0	64	15	0
Confl. Peds. (#/hr)			88	88			188		40			
Heavy Vehicles (%)	10%	10%	10%	13%	13%	13%	7%	7%	7%	5%	5%	5%
Turn Type	pm+pt		Perm	pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	69.5	65.6	65.6	63.5	62.1			9.0		9.0	9.0	
Effective Green, g (s)	69.5	67.6	66.6	64.5	64.1			9.0		9.0	9.0	
Actuated g/C Ratio	0.77	0.75	0.74	0.72	0.71			0.10		0.10	0.10	
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	536	1297	764	644	2247			127		105	160	
v/s Ratio Prot	c0.00	c0.16		0.00	c0.20						0.01	
v/s Ratio Perm	0.07		0.01	0.01				0.04		c0.06		
v/c Ratio	0.09	0.21	0.02	0.02	0.28			0.43		0.61	0.09	
Uniform Delay, d <sub>1</sub>	2.7	3.3	3.1	3.6	4.7			38.1		38.8	36.8	
Progression Factor	1.00	1.00	1.00	0.56	0.26			1.00		1.00	1.00	
Incremental Delay, d <sub>2</sub>	0.1	0.4	0.0	0.0	0.3			2.4		9.6	0.3	
Delay (s)	2.7	3.7	3.1	2.0	1.5			40.4		48.5	37.0	
Level of Service	A	A	A	A	A			D		D	D	
Approach Delay (s)		3.5			1.5			40.4			43.6	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM Average Control Delay			9.7		HCM Level of Service			A				
HCM Volume to Capacity ratio			0.33									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)			16.0				
Intersection Capacity Utilization			49.9%		ICU Level of Service			A				
Analysis Period (min)			15									
c Critical Lane Group												



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	15	75	415	505	310	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0			
Lane Util. Factor	0.95	1.00	1.00			
Fr <sub>t</sub>	1.00	0.93	0.99			
Flt Protected	0.99	1.00	0.96			
Satd. Flow (prot)	3346	1675	1728			
Flt Permitted	0.82	1.00	0.96			
Satd. Flow (perm)	2783	1675	1728			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	80	441	537	330	27
RTOR Reduction (vph)	0	0	49	0	3	0
Lane Group Flow (vph)	0	96	929	0	354	0
Heavy Vehicles (%)	7%	7%	5%	5%	4%	4%
Turn Type	Perm					
Protected Phases		2	6		8	
Permitted Phases		2				
Actuated Green, G (s)		57.0	57.0		23.0	
Effective Green, g (s)		57.0	57.0		23.0	
Actuated g/C Ratio		0.63	0.63		0.26	
Clearance Time (s)		5.0	5.0		5.0	
Lane Grp Cap (vph)		1763	1061		442	
v/s Ratio Prot			c0.55		c0.20	
v/s Ratio Perm		0.03				
v/c Ratio		0.05	0.88		0.80	
Uniform Delay, d1		6.3	13.6		31.4	
Progression Factor		0.97	0.49		1.00	
Incremental Delay, d2		0.1	6.9		14.2	
Delay (s)		6.1	13.6		45.5	
Level of Service		A	B		D	
Approach Delay (s)		6.1	13.6		45.5	
Approach LOS		A	B		D	
<b>Intersection Summary</b>						
HCM Average Control Delay		21.1	HCM Level of Service		C	
HCM Volume to Capacity ratio		0.85				
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		10.0	
Intersection Capacity Utilization		79.8%	ICU Level of Service		D	
Analysis Period (min)		15				
c Critical Lane Group						

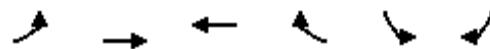
HCM Unsignalized Intersection Capacity Analysis  
21: Lebaum St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	10	15	15	340	55	1235	0	0	420	20
Sign Control		Stop				Stop			Free			Free
Grade		0%				0%			0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	0	11	16	16	362	59	1314	0	0	447	21
Pedestrians		126				60			28			86
Lane Width (ft)		12.0				12.0			12.0			12.0
Walking Speed (ft/s)		4.0				4.0			4.0			4.0
Percent Blockage		10				5			2			7
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								433			535	
pX, platoon unblocked	0.69	0.69		0.69	0.69	0.69					0.69	
vC, conflicting volume	1813	2074	388	1753	2085	803	594				1374	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1290	1666	388	1203	1682	0	594				657	
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.2				4.2	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.3	
p0 queue free %	22	100	98	78	68	45	93				100	
cM capacity (veh/h)	20	54	539	73	50	660	857				589	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	27	394	59	657	657	298	170					
Volume Left	16	16	59	0	0	0	0					
Volume Right	11	362	0	0	0	0	21					
cSH	33	363	857	1700	1700	1700	1700					
Volume to Capacity	0.80	1.08	0.07	0.39	0.39	0.18	0.10					
Queue Length 95th (ft)	69	355	5	0	0	0	0					
Control Delay (s)	269.8	105.7	9.5	0.0	0.0	0.0	0.0					
Lane LOS	F	F	A									
Approach Delay (s)	269.8	105.7	0.4			0.0						
Approach LOS	F	F										
Intersection Summary												
Average Delay			21.8									
Intersection Capacity Utilization		68.4%		ICU Level of Service				C				
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis  
102: Alabama Ave & 8th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	55	330	885	445	5	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	59	351	941	473	5	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		350	121			
pX, platoon unblocked	0.88			0.88	0.88	
vC, conflicting volume	1415			1471	707	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1193			1256	386	
tC, single (s)	4.2			7.0	7.1	
tC, 2 stage (s)						
tF (s)	2.2			3.6	3.4	
p0 queue free %	88			95	93	
cM capacity (veh/h)	500			116	513	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	176	234	628	787	43	
Volume Left	59	0	0	0	5	
Volume Right	0	0	0	473	37	
cSH	500	1700	1700	1700	360	
Volume to Capacity	0.12	0.14	0.37	0.46	0.12	
Queue Length 95th (ft)	10	0	0	0	10	
Control Delay (s)	5.5	0.0	0.0	0.0	16.4	
Lane LOS	A				C	
Approach Delay (s)	2.4		0.0		16.4	
Approach LOS					C	
<b>Intersection Summary</b>						
Average Delay			0.9			
Intersection Capacity Utilization		61.1%		ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
105: Alabama Ave & 12th St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	315	15	10	605	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	335	16	11	644	5	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	397		518			
pX, platoon unblocked				0.99		
vC, conflicting volume		351		686	343	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		351		667	343	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		99		99	99	
cM capacity (veh/h)		1204		386	653	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	351	225	429	11		
Volume Left	0	11	0	5		
Volume Right	16	0	0	5		
cSH	1700	1204	1700	485		
Volume to Capacity	0.21	0.01	0.25	0.02		
Queue Length 95th (ft)	0	1	0	2		
Control Delay (s)	0.0	0.5	0.0	12.6		
Lane LOS		A		B		
Approach Delay (s)	0.0	0.2		12.6		
Approach LOS				B		
<b>Intersection Summary</b>						
Average Delay		0.2				
Intersection Capacity Utilization		33.8%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
106: Martin Luther King Jr Ave & 4th St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↓		↑	↑↓	↑	↑
Volume (veh/h)	540	10	110	315	10	450
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	574	11	117	335	11	479
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					5	
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)			481			
pX, platoon unblocked						
vC, conflicting volume		585		981	293	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		585		981	293	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		88		95	32	
cM capacity (veh/h)		986		217	704	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	383	202	117	168	168	489
Volume Left	0	0	117	0	0	11
Volume Right	0	11	0	0	0	479
cSH	1700	1700	986	1700	1700	720
Volume to Capacity	0.23	0.12	0.12	0.10	0.10	0.68
Queue Length 95th (ft)	0	0	10	0	0	134
Control Delay (s)	0.0	0.0	9.1	0.0	0.0	20.3
Lane LOS			A			C
Approach Delay (s)	0.0		2.4		20.3	
Approach LOS					C	
<b>Intersection Summary</b>						
Average Delay			7.2			
Intersection Capacity Utilization		49.8%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
210: Malcolm X Ave & 7th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	35	285	50	300	150	305	210	5	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	37	303	53	319	160	324	223	5	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total (vph)	351	532	553									
Volume Left (vph)	11	53	324									
Volume Right (vph)	303	160	5									
Hadj (s)	-0.48	-0.13	0.15									
Departure Headway (s)	6.5	6.4	6.7									
Degree Utilization, x	0.63	0.95	1.03									
Capacity (veh/h)	541	532	541									
Control Delay (s)	19.8	51.2	72.7									
Approach Delay (s)	19.8	51.2	72.7									
Approach LOS	C	F	F									
Intersection Summary												
Delay				51.8								
HCM Level of Service					F							
Intersection Capacity Utilization				83.7%		ICU Level of Service			E			
Analysis Period (min)					15							

# No Build PM

HCM Signalized Intersection Capacity Analysis  
19: West Campus Gate 1 (Employees) & M.L.King Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	330	0	140	0	0	5	10	935	0	5	1065	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0		4.0	4.0		5.0	4.0	
Lane Util. Factor	1.00				1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00				0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00				1.00		1.00	1.00		0.98	1.00	
Fr <sub>t</sub>	0.96				0.86		1.00	1.00		1.00	0.98	
Fl <sub>t</sub> Protected	0.97				1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1723				1618		1703	3406		1642	3272	
Fl <sub>t</sub> Permitted	0.79				1.00		0.12	1.00		0.20	1.00	
Satd. Flow (perm)	1406				1618		215	3406		348	3272	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	351	0	149	0	0	5	11	995	0	5	1133	128
RTOR Reduction (vph)	0	18	0	0	3	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	482	0	0	2	0	11	995	0	5	1252	0
Confl. Peds. (#/hr)	2					2	14		44	44		14
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	6%	6%	6%	8%	8%	8%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		8			8			2			6	
Permitted Phases	8			8			2			6		
Actuated Green, G (s)	34.3			34.3			45.7	45.7		45.7	45.7	
Effective Green, g (s)	34.3			34.3			46.7	46.7		45.7	46.7	
Actuated g/C Ratio	0.38			0.38			0.52	0.52		0.51	0.52	
Clearance Time (s)	5.0			5.0			5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0			3.0			3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	536			617			112	1767		177	1698	
v/s Ratio Prot				0.00				0.29			c0.38	
v/s Ratio Perm	c0.34						0.05			0.01		
v/c Ratio	0.90			0.00			0.10	0.56		0.03	0.74	
Uniform Delay, d1	26.2			17.3			11.0	14.7		11.1	16.9	
Progression Factor	1.00			1.00			0.76	0.59		1.00	1.00	
Incremental Delay, d2	17.8			0.0			1.2	0.9		0.3	2.9	
Delay (s)	44.0			17.3			9.5	9.6		11.4	19.8	
Level of Service	D			B			A	A		B	B	
Approach Delay (s)	44.0			17.3				9.6			19.7	
Approach LOS	D			B				A			B	
Intersection Summary												
HCM Average Control Delay	20.4			HCM Level of Service			C					
HCM Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			9.0					
Intersection Capacity Utilization	74.4%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
20: West Campus Gate 2 (Visitors) & M.L.King Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	0	60	225	0	270	55	605	5	165	985	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0		5.0	5.0		5.0		5.0
Lane Util. Factor	1.00				1.00		1.00	0.95		1.00		0.95
Frpb, ped/bikes	0.99				0.99		1.00	1.00		1.00		1.00
Flpb, ped/bikes	1.00				0.99		1.00	1.00		1.00		1.00
Fr <sub>t</sub>	0.94				0.93		1.00	1.00		1.00		0.99
Flt Protected	0.97				0.98		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1678				1653		1671	3339		1671		3305
Flt Permitted	0.97				0.79		0.13	1.00		0.28		1.00
Satd. Flow (perm)	1678				1332		235	3339		498		3305
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	0	64	239	0	287	59	644	5	176	1048	59
RTOR Reduction (vph)	0	35	0	0	48	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	103	0	0	478	0	59	648	0	176	1102	0
Confl. Peds. (#/hr)	8		10	10		8	16					16
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	8%	8%	8%	8%	8%	8%
Turn Type	Split			Perm			Perm			Perm		
Protected Phases	2	2			6			4			8	
Permitted Phases			6			4			8			
Actuated Green, G (s)	16.0				29.0		30.0	30.0		30.0		30.0
Effective Green, g (s)	16.0				29.0		30.0	30.0		30.0		30.0
Actuated g/C Ratio	0.18				0.32		0.33	0.33		0.33		0.33
Clearance Time (s)	5.0				5.0		5.0	5.0		5.0		5.0
Vehicle Extension (s)	3.0				3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	298				429		78	1113		166		1102
v/s Ratio Prot	c0.06						0.19					0.33
v/s Ratio Perm					c0.36		0.25			c0.35		
v/c Ratio	0.35				1.11		0.76	0.58		1.06		1.00
Uniform Delay, d1	32.4				30.5		26.7	24.8		30.0		30.0
Progression Factor	1.00				1.00		0.77	0.75		0.90		0.88
Incremental Delay, d2	3.2				78.2		48.1	2.2		72.9		21.8
Delay (s)	35.6				108.7		68.6	20.8		99.8		48.1
Level of Service	D				F		E	C		F		D
Approach Delay (s)	35.6				108.7			24.8				55.2
Approach LOS	D				F			C				E
<b>Intersection Summary</b>												
HCM Average Control Delay	56.7				HCM Level of Service			E				
HCM Volume to Capacity ratio	0.93											
Actuated Cycle Length (s)	90.0				Sum of lost time (s)			15.0				
Intersection Capacity Utilization	79.2%				ICU Level of Service			D				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
26: Malcolm X Ave & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	325	365	25	250	10	305	140	55	255	845	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0			4.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00			1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00			1.00	0.85		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		1.00			1.00	1.00		0.81	1.00	
Fr <sub>t</sub>	1.00	0.85		1.00			1.00	0.96		1.00	0.99	
Flt Protected	0.98	1.00		1.00			0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1763	1447		1818			1736	2834		1358	3214	
Flt Permitted	0.69	1.00		0.86			0.16	1.00		0.57	1.00	
Satd. Flow (perm)	1232	1447		1578			283	2834		816	3214	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	213	346	388	27	266	11	324	149	59	271	899	90
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	559	388	0	304	0	324	208	0	271	989	0
Confl. Peds. (#/hr)	64		70	70		64	116		134	134		116
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	4%	4%	4%	8%	8%	8%
Turn Type	pm+pt		pm+ov		Perm		pm+pt		pm+pt		pm+pt	
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	38.0	49.0		38.0		35.8	24.8		38.2	26.0		
Effective Green, g (s)	40.0	51.0		40.0		37.8	26.8		42.2	28.0		
Actuated g/C Ratio	0.44	0.57		0.44		0.42	0.30		0.47	0.31		
Clearance Time (s)	5.0	5.0		5.0		5.0	5.0		5.0	5.0		
Vehicle Extension (s)	3.0	3.0		3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	548	884		701		313	844		468	1000		
v/s Ratio Prot		0.06				c0.14	0.07		c0.09	c0.31		
v/s Ratio Perm		c0.45	0.21		0.19		0.30			0.18		
v/c Ratio		1.02	0.44		0.43		1.04	0.25		0.58	0.99	
Uniform Delay, d1	25.0	11.2		17.2		23.3	23.9		15.9	30.8		
Progression Factor	0.29	0.15		1.00		0.71	0.62		0.70	0.62		
Incremental Delay, d2	41.2	0.3		0.4		59.8	0.7		1.5	24.2		
Delay (s)	48.4	2.0		17.6		76.2	15.6		12.6	43.2		
Level of Service	D	A		B		E	B		B	D		
Approach Delay (s)	29.3			17.6			52.5			36.6		
Approach LOS	C			B			D			D		
Intersection Summary												
HCM Average Control Delay	35.2			HCM Level of Service			D					
HCM Volume to Capacity ratio	1.02											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			10.0					
Intersection Capacity Utilization	101.6%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
27: Raleigh PI & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	WBL	WBR	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations								
Volume (vph)	30	20	15	35	445	0	255	980
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		3.0		3.0	3.0
Lane Util. Factor	1.00		1.00		0.95		1.00	0.95
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Frt	0.95		0.91		1.00		1.00	1.00
Flt Protected	0.97		0.99		1.00		0.95	1.00
Satd. Flow (prot)	1679		1695		3471		1719	3438
Flt Permitted	0.97		0.99		1.00		0.43	1.00
Satd. Flow (perm)	1679		1695		3471		776	3438
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	21	16	37	473	0	271	1043
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	53	0	53	0	473	0	271	1043
Confl. Peds. (#/hr)				26				
Heavy Vehicles (%)	4%	4%	0%	0%	4%	4%	5%	5%
Turn Type							D.P+P	
Protected Phases	8		4		2		1	6
Permitted Phases							2	
Actuated Green, G (s)	5.8		4.6		40.6		59.6	64.6
Effective Green, g (s)	6.8		5.6		42.6		63.6	66.6
Actuated g/C Ratio	0.08		0.06		0.47		0.71	0.74
Clearance Time (s)	5.0		5.0		5.0		5.0	5.0
Vehicle Extension (s)	3.0		1.0		1.0		1.0	1.0
Lane Grp Cap (vph)	127		105		1643		768	2544
v/s Ratio Prot	c0.03		c0.03		0.14		0.08	c0.30
v/s Ratio Perm							0.17	
v/c Ratio	0.42		0.50		0.29		0.35	0.41
Uniform Delay, d1	39.7		40.9		14.5		7.8	4.4
Progression Factor	1.00		1.00		0.95		0.50	0.54
Incremental Delay, d2	2.2		1.4		0.4		0.1	0.3
Delay (s)	41.9		42.2		14.1		3.9	2.6
Level of Service	D		D		B		A	A
Approach Delay (s)	41.9		42.2		14.1			2.9
Approach LOS	D		D		B			A
Intersection Summary								
HCM Average Control Delay		7.9		HCM Level of Service			A	
HCM Volume to Capacity ratio		0.42						
Actuated Cycle Length (s)		90.0		Sum of lost time (s)			11.0	
Intersection Capacity Utilization		49.8%		ICU Level of Service			A	
Analysis Period (min)		15						
c Critical Lane Group								

HCM Signalized Intersection Capacity Analysis  
28: Martin Luther King Jr Ave & Alabama Ave

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (vph)	325	210	175	850	30	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	5.0
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00		0.99	1.00	1.00	1.00
Fr <sub>t</sub>	0.94		1.00	1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3281		1698	3438	3433	1541
Fl <sub>t</sub> Permitted	1.00		0.44	1.00	0.95	1.00
Satd. Flow (perm)	3281		783	3438	3433	1541
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	346	223	186	904	32	128
RTOR Reduction (vph)	78	0	0	0	0	112
Lane Group Flow (vph)	491	0	186	904	32	16
Confl. Peds. (#/hr)		20	20		20	20
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Turn Type		Perm		Perm		
Protected Phases	2		6	4		
Permitted Phases		6		4		
Actuated Green, G (s)	29.3	29.3	29.3	5.7	5.7	
Effective Green, g (s)	29.3	29.3	29.3	5.7	5.7	
Actuated g/C Ratio	0.65	0.65	0.65	0.13	0.13	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2136	510	2239	435	195	
v/s Ratio Prot	0.15		c0.26	0.01		
v/s Ratio Perm		0.24		c0.01		
v/c Ratio	0.23	0.36	0.40	0.07	0.08	
Uniform Delay, d <sub>1</sub>	3.2	3.6	3.7	17.3	17.3	
Progression Factor	1.00	0.28	0.29	1.00	1.00	
Incremental Delay, d <sub>2</sub>	0.3	1.9	0.5	0.1	0.2	
Delay (s)	3.5	2.9	1.6	17.4	17.5	
Level of Service	A	A	A	B	B	
Approach Delay (s)	3.5		1.8	17.5		
Approach LOS	A		A	B		
Intersection Summary						
HCM Average Control Delay		3.7	HCM Level of Service		A	
HCM Volume to Capacity ratio		0.35				
Actuated Cycle Length (s)		45.0	Sum of lost time (s)		10.0	
Intersection Capacity Utilization		48.5%	ICU Level of Service		A	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis  
46: Cypress St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	20	10	340	15	90	25	235	80	200	835	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00			1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	0.97			1.00	0.99		1.00	0.93		1.00	1.00	
Flpb, ped/bikes	1.00			0.93	1.00		1.00	1.00		0.85	1.00	
Fr <sub>t</sub>	0.95			1.00	0.87		1.00	0.96		1.00	1.00	
Fl <sub>t</sub> Protected	1.00			0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1631			1559	1510		1687	3019		1503	3529	
Fl <sub>t</sub> Permitted	1.00			0.74	1.00		0.25	1.00		0.53	1.00	
Satd. Flow (perm)	1631			1208	1510		438	3019		846	3529	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	21	11	362	16	96	27	250	85	213	888	5
RTOR Reduction (vph)	0	7	0	0	59	0	0	31	0	0	0	0
Lane Group Flow (vph)	0	25	0	362	53	0	27	304	0	213	893	0
Confl. Peds. (#/hr)	4			52	52		4	72		52	52	72
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	7%	7%	7%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	32.3			32.3	32.3		47.7	47.7		47.7	47.7	
Effective Green, g (s)	34.3			34.3	34.3		49.7	49.7		49.7	49.7	
Actuated g/C Ratio	0.38			0.38	0.38		0.55	0.55		0.55	0.55	
Clearance Time (s)	5.0			5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	622			460	575		242	1667		467	1949	
v/s Ratio Prot	0.02				0.03			0.10			c0.25	
v/s Ratio Perm			c0.30				0.06			0.25		
v/c Ratio	0.04		0.79	0.09			0.11	0.18		0.46	0.46	
Uniform Delay, d1	17.5		24.6	17.9			9.6	10.0		12.1	12.1	
Progression Factor	1.00		1.00	1.00			0.83	0.90		0.18	0.14	
Incremental Delay, d2	0.0		8.6	0.1			0.7	0.2		2.9	0.7	
Delay (s)	17.5		33.3	17.9			8.7	9.2		5.1	2.4	
Level of Service	B		C	B			A	A		A	A	
Approach Delay (s)	17.5			29.6				9.1			2.9	
Approach LOS	B			C			A				A	
Intersection Summary												
HCM Average Control Delay	10.7			HCM Level of Service				B				
HCM Volume to Capacity ratio	0.59											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)				6.0				
Intersection Capacity Utilization	75.4%			ICU Level of Service				D				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
48: Pecan St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↑	↑	↑↑		↑	↑↑
Volume (vph)	25	350	315	10	255	1015
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fr <sub>t</sub>	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1736	1553	3296		1703	3406
Flt Permitted	0.95	1.00	1.00		0.53	1.00
Satd. Flow (perm)	1736	1553	3296		944	3406
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	372	335	11	271	1080
RTOR Reduction (vph)	0	141	2	0	0	0
Lane Group Flow (vph)	27	231	344	0	271	1080
Heavy Vehicles (%)	4%	4%	9%	9%	6%	6%
Turn Type	pm+ov			D.P+P		
Protected Phases	3	1	2		1	1 2
Permitted Phases		3	2		2	
Actuated Green, G (s)	18.0	40.4	35.6		58.0	62.0
Effective Green, g (s)	18.0	40.4	35.6		58.0	62.0
Actuated g/C Ratio	0.20	0.45	0.40		0.64	0.69
Clearance Time (s)	5.0	4.0	5.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	347	697	1304		797	2346
v/s Ratio Prot	0.02	c0.08	0.10		0.08	c0.32
v/s Ratio Perm		0.07			0.13	
v/c Ratio	0.08	0.33	0.26		0.34	0.46
Uniform Delay, d1	29.3	16.1	18.4		6.8	6.4
Progression Factor	1.00	1.00	0.73		0.55	0.45
Incremental Delay, d2	0.4	0.3	0.5		0.1	0.0
Delay (s)	29.7	16.3	14.0		3.8	2.9
Level of Service	C	B	B		A	A
Approach Delay (s)	17.2		14.0		3.1	
Approach LOS	B		B		A	
<b>Intersection Summary</b>						
HCM Average Control Delay		7.6	HCM Level of Service		A	
HCM Volume to Capacity ratio		0.42				
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization		38.9%	ICU Level of Service		A	
Analysis Period (min)		15				
c Critical Lane Group						

## HCM Signalized Intersection Capacity Analysis

29: Alabama Ave &amp; Randle Pl

CH2M HILL

12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	365	10	5	80	30	10	10	10	175	20	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0	5.0		5.0			5.0	
Lane Util. Factor	0.95				1.00	1.00		1.00			1.00	
Frpb, ped/bikes	0.99				1.00	0.58		0.99			0.95	
Flpb, ped/bikes	0.99				0.99	1.00		1.00			1.00	
Fr <sub>t</sub>	1.00				1.00	0.85		0.95			0.97	
Flt Protected	1.00				1.00	1.00		0.98			0.97	
Satd. Flow (prot)	3201				1720	858		1759			1610	
Flt Permitted	0.95				0.98	1.00		0.98			0.97	
Satd. Flow (perm)	3043				1690	858		1759			1610	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	388	11	5	85	32	11	11	11	186	21	64
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	410	0	0	90	32	0	33	0	0	271	0
Confl. Peds. (#/hr)	92		78	78		92	126		6	6		126
Heavy Vehicles (%)	10%	10%	10%	9%	9%	9%	0%	0%	0%	5%	5%	5%
Turn Type	Perm		Perm		Perm		Split			Split		
Protected Phases		2			6		7	7		8	8	
Permitted Phases	2		6		6							
Actuated Green, G (s)	39.8				39.8	39.8		3.4			18.8	
Effective Green, g (s)	40.8				40.8	40.8		4.4			19.8	
Actuated g/C Ratio	0.51				0.51	0.51		0.06			0.25	
Clearance Time (s)	6.0				6.0	6.0		6.0			6.0	
Vehicle Extension (s)	1.0				1.0	1.0		3.0			3.0	
Lane Grp Cap (vph)	1552				862	438		97			398	
v/s Ratio Prot							c0.02			c0.17		
v/s Ratio Perm	c0.13				0.05	0.04						
v/c Ratio	0.26				0.10	0.07		0.34			0.68	
Uniform Delay, d1	11.1				10.1	10.0		36.4			27.2	
Progression Factor	1.00				0.84	0.84		1.00			1.00	
Incremental Delay, d2	0.4				0.2	0.3		2.1			4.7	
Delay (s)	11.5				8.7	8.7		38.5			32.0	
Level of Service	B				A	A		D			C	
Approach Delay (s)	11.5				8.7			38.5			32.0	
Approach LOS	B				A			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay	18.8				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.40											
Actuated Cycle Length (s)	80.0				Sum of lost time (s)				15.0			
Intersection Capacity Utilization	45.1%				ICU Level of Service				A			
Analysis Period (min)	15											
c Critical Lane Group												



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	625	505	185	200	180	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00	1.00		0.98	0.95	1.00
Satd. Flow (prot)	1810	1538		3390	1703	1524
Fl <sub>t</sub> Permitted	1.00	1.00		0.54	0.95	1.00
Satd. Flow (perm)	1810	1538		1884	1703	1524
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	665	537	197	213	191	48
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	665	537	0	410	191	48
Confl. Peds. (#/hr)		32	32		2	8
Heavy Vehicles (%)	5%	5%	4%	4%	6%	6%
Turn Type	custom	pm+pt		pt+ov		
Protected Phases	4 5	2 5	3	8	2	2 3
Permitted Phases			8			
Actuated Green, G (s)	34.0	34.0		45.0	25.0	36.0
Effective Green, g (s)	36.0	35.0		47.0	27.0	38.0
Actuated g/C Ratio	0.45	0.44		0.59	0.34	0.48
Clearance Time (s)				5.0	5.0	
Lane Grp Cap (vph)	815	673		1257	575	724
v/s Ratio Prot	c0.37	c0.35		c0.03	0.11	0.03
v/s Ratio Perm				0.16		
v/c Ratio	0.82	0.80		0.33	0.33	0.07
Uniform Delay, d <sub>1</sub>	19.1	19.4		8.4	19.8	11.4
Progression Factor	0.85	0.84		0.64	1.00	1.00
Incremental Delay, d <sub>2</sub>	7.8	8.5		0.7	1.5	0.2
Delay (s)	24.1	24.9		6.1	21.3	11.6
Level of Service	C	C		A	C	B
Approach Delay (s)	24.5			6.1	19.4	
Approach LOS	C			A	B	
<b>Intersection Summary</b>						
HCM Average Control Delay		19.7		HCM Level of Service		B
HCM Volume to Capacity ratio		0.74				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		66.3%		ICU Level of Service		C
Analysis Period (min)		15				

c Critical Lane Group

## HCM Signalized Intersection Capacity Analysis

31: Alabama Ave &amp; 11th Pl

CH2M HILL

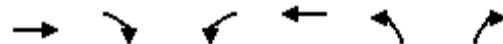
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	535	40	15	320	40	25	5	15	90	15	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)								4.0				4.0
Lane Util. Factor	0.95				0.95			1.00				1.00
Frpb, ped/bikes	0.99				1.00			1.00				1.00
Flpb, ped/bikes	1.00				1.00			1.00				1.00
Fr <sub>t</sub>	0.99				0.98			0.95				0.92
Flt Protected	0.99				1.00			0.97				0.98
Satd. Flow (prot)	3289				3353			1688				1683
Flt Permitted	0.88				0.93			0.80				0.87
Satd. Flow (perm)	2910				3125			1395				1485
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	80	569	43	16	340	43	27	5	16	96	16	170
RTOR Reduction (vph)	0	8	0	0	16	0	0	12	0	0	131	0
Lane Group Flow (vph)	0	684	0	0	383	0	0	36	0	0	151	0
Confl. Peds. (#/hr)			80	80			10		4			
Heavy Vehicles (%)	2%	8%	8%	6%	6%	2%	4%	2%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	22.9			22.9			9.1			9.1		
Effective Green, g (s)	24.9			24.9			9.1			9.1		
Actuated g/C Ratio	0.62			0.62			0.23			0.23		
Clearance Time (s)	4.0			4.0			4.0			4.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	1811			1945			317			338		
v/s Ratio Prot												
v/s Ratio Perm	c0.23			0.12			0.03			c0.10		
v/c Ratio	0.38			0.20			0.11			0.45		
Uniform Delay, d1	3.7			3.2			12.2			13.3		
Progression Factor	0.72			1.35			1.00			1.00		
Incremental Delay, d2	0.4			0.2			0.2			0.9		
Delay (s)	3.1			4.6			12.4			14.2		
Level of Service	A			A			B			B		
Approach Delay (s)	3.1			4.6			12.4			14.2		
Approach LOS	A			A			B			B		
<b>Intersection Summary</b>												
HCM Average Control Delay	6.0			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.39											
Actuated Cycle Length (s)	40.0			Sum of lost time (s)			6.0					
Intersection Capacity Utilization	55.9%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
32: Alabama Ave & WMATA Driveway

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑↑			↔		↑	↑	
Volume (vph)	45	545	15	160	355	50	50	10	45	35	15	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0	4.0	3.5	3.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.73	1.00	1.00			0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			0.87		1.00	1.00	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.98			0.94		1.00	0.94	
Fl <sub>t</sub> Protected	0.95	1.00	1.00	0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1641	1727	1077	1719	3375			1383		1770	1749	
Fl <sub>t</sub> Permitted	0.50	1.00	1.00	0.33	1.00			0.84		0.68	1.00	
Satd. Flow (perm)	866	1727	1077	589	3375			1183		1271	1749	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	580	16	170	378	53	53	11	48	37	16	11
RTOR Reduction (vph)	0	0	3	0	8	0	0	42	0	0	10	0
Lane Group Flow (vph)	48	580	13	170	423	0	0	70	0	37	17	0
Confl. Peds. (#/hr)			88	88			188		40			
Heavy Vehicles (%)	10%	10%	10%	5%	5%	5%	6%	6%	6%	2%	2%	2%
Turn Type	pm+pt		Perm	pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	53.2	49.0	49.0	60.8	52.8			9.0		9.0	9.0	
Effective Green, g (s)	53.2	51.0	50.0	61.5	54.8			9.0		9.0	9.0	
Actuated g/C Ratio	0.67	0.64	0.62	0.77	0.68			0.11		0.11	0.11	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	617	1101	673	573	2312			133		143	197	
v/s Ratio Prot	0.00	c0.34		c0.03	0.13						0.01	
v/s Ratio Perm	0.05		0.01	0.20			c0.06			0.03		
v/c Ratio	0.08	0.53	0.02	0.30	0.18			0.53		0.26	0.09	
Uniform Delay, d <sub>1</sub>	4.6	7.9	5.7	4.0	4.5			33.5		32.5	31.8	
Progression Factor	0.56	0.51	0.59	0.54	1.00			1.00		1.00	1.00	
Incremental Delay, d <sub>2</sub>	0.1	1.7	0.0	0.3	0.2			3.8		1.0	0.2	
Delay (s)	2.7	5.8	3.4	2.4	4.7			37.3		33.4	32.0	
Level of Service	A	A	A	A	A			D		C	C	
Approach Delay (s)		5.5			4.1			37.3			32.8	
Approach LOS		A			A			D			C	
Intersection Summary												
HCM Average Control Delay			8.6		HCM Level of Service			A				
HCM Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			80.0		Sum of lost time (s)			11.5				
Intersection Capacity Utilization			66.2%		ICU Level of Service			C				
Analysis Period (min)			15									
c Critical Lane Group												



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖↑	↖	↗
Volume (vph)	605	20	25	555	10	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	1810	1538		3431	1736	1553
Fl <sub>t</sub> Permitted	1.00	1.00		0.91	0.95	1.00
Satd. Flow (perm)	1810	1538		3138	1736	1553
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	644	21	27	590	11	43
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	644	21	0	617	11	43
Confl. Peds. (#/hr)					2	
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%
Turn Type		Perm	Perm		custom	
Protected Phases	4			8	2	2
Permitted Phases		4	8			2
Actuated Green, G (s)	47.0	47.0		47.0	20.0	20.0
Effective Green, g (s)	53.0	48.0		53.0	21.0	21.0
Actuated g/C Ratio	0.66	0.60		0.66	0.26	0.26
Clearance Time (s)	9.0	9.0		9.0	4.0	4.0
Lane Grp Cap (vph)	1199	923		2079	456	408
v/s Ratio Prot	c0.36				0.01	c0.03
v/s Ratio Perm		0.01		0.20		
v/c Ratio	0.54	0.02		0.30	0.02	0.11
Uniform Delay, d <sub>1</sub>	7.1	6.5		5.7	21.9	22.4
Progression Factor	0.27	0.24		0.58	1.00	1.00
Incremental Delay, d <sub>2</sub>	1.5	0.0		0.3	0.1	0.5
Delay (s)	3.5	1.6		3.6	22.0	22.9
Level of Service	A	A		A	C	C
Approach Delay (s)	3.4			3.6	22.7	
Approach LOS	A			A	C	
<b>Intersection Summary</b>						
HCM Average Control Delay		4.3		HCM Level of Service		A
HCM Volume to Capacity ratio		0.41				
Actuated Cycle Length (s)		80.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		48.7%		ICU Level of Service		A
Analysis Period (min)		15				

c Critical Lane Group

## HCM Signalized Intersection Capacity Analysis

34: Alabama Ave &amp; Stanton Rd

CH2M HILL

12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	455	90	45	405	65	55	175	50	70	230	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor	0.95				0.95			1.00			1.00	
Frpb, ped/bikes	0.99				0.99			0.99			0.99	
Flpb, ped/bikes	1.00				1.00			1.00			1.00	
Fr <sub>t</sub>	0.98				0.98			0.98			0.96	
Flt Protected	0.99				1.00			0.99			0.99	
Satd. Flow (prot)	3292				3319			1762			1700	
Flt Permitted	0.79				0.85			0.87			0.90	
Satd. Flow (perm)	2613				2835			1554			1535	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	106	484	96	48	431	69	59	186	53	74	245	128
RTOR Reduction (vph)	0	33	0	0	28	0	0	20	0	0	36	0
Lane Group Flow (vph)	0	654	0	0	520	0	0	278	0	0	411	0
Confl. Peds. (#/hr)	34		30	30		34	30		50	50		30
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	3%	3%	3%	5%	5%	5%
Turn Type	Perm		Perm			Perm			Perm		Perm	
Protected Phases		4			8			2			6	
Permitted Phases	4		8			2			6			
Actuated Green, G (s)	13.0				13.0			15.0			15.0	
Effective Green, g (s)	15.0				15.0			17.0			17.0	
Actuated g/C Ratio	0.38				0.38			0.42			0.42	
Clearance Time (s)	6.0				6.0			6.0			6.0	
Lane Grp Cap (vph)	980				1063			660			652	
v/s Ratio Prot												
v/s Ratio Perm	c0.25				0.18			0.18			c0.27	
v/c Ratio	0.67				0.49			0.42			0.63	
Uniform Delay, d1	10.4				9.6			8.1			9.0	
Progression Factor	0.94				1.00			1.00			1.00	
Incremental Delay, d2	3.1				1.6			2.0			4.6	
Delay (s)	13.0				11.2			10.0			13.6	
Level of Service	B				B			B			B	
Approach Delay (s)	13.0				11.2			10.0			13.6	
Approach LOS	B				B			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay	12.2				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.65											
Actuated Cycle Length (s)	40.0				Sum of lost time (s)			8.0				
Intersection Capacity Utilization	74.2%				ICU Level of Service			D				
Analysis Period (min)	15											
c Critical Lane Group												



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑		↔	
Volume (vph)	25	525	95	140	465	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		0.95	1.00		1.00	
Fr <sub>t</sub>		1.00	0.92		0.99	
Flt Protected		1.00	1.00		0.95	
Satd. Flow (prot)		3274	1618		1785	
Flt Permitted		0.94	1.00		0.95	
Satd. Flow (perm)		3072	1618		1785	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	559	101	149	495	21
RTOR Reduction (vph)	0	0	89	0	4	0
Lane Group Flow (vph)	0	586	161	0	512	0
Heavy Vehicles (%)	10%	10%	8%	8%	1%	1%
Turn Type	Perm					
Protected Phases		2	6		8	
Permitted Phases	2					
Actuated Green, G (s)		16.0	16.0		16.0	
Effective Green, g (s)		16.0	16.0		16.0	
Actuated g/C Ratio		0.40	0.40		0.40	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1229	647		714	
v/s Ratio Prot			0.10		c0.29	
v/s Ratio Perm		c0.19				
v/c Ratio		0.48	0.25		0.72	
Uniform Delay, d1		8.9	8.0		10.1	
Progression Factor		1.03	0.60		1.00	
Incremental Delay, d2		1.3	0.9		6.1	
Delay (s)		10.5	5.7		16.2	
Level of Service		B	A		B	
Approach Delay (s)		10.5	5.7		16.2	
Approach LOS		B	A		B	
<b>Intersection Summary</b>						
HCM Average Control Delay		11.8	HCM Level of Service		B	
HCM Volume to Capacity ratio		0.60				
Actuated Cycle Length (s)		40.0	Sum of lost time (s)		8.0	
Intersection Capacity Utilization		65.8%	ICU Level of Service		C	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis  
21: Lebaum St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	10	5	5	25	40	310	0	0	1170	15
Sign Control		Stop				Stop			Free			Free
Grade		0%				0%			0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	0	11	5	5	27	43	330	0	0	1245	16
Pedestrians		126				60			28			86
Lane Width (ft)		12.0				12.0			12.0			12.0
Walking Speed (ft/s)		4.0				4.0			4.0			4.0
Percent Blockage		10				5			2			7
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								433			535	
pX, platoon unblocked	0.85	0.85	0.85	0.85	0.85			0.85				
vC, conflicting volume	1744	1854	784	1136	1862	311	1387				390	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1529	1658	406	817	1667	311	1111				390	
tC, single (s)	7.8	6.8	7.2	7.7	6.7	7.1	4.2				4.2	
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.6	4.1	3.4	2.3				2.3	
p0 queue free %	85	100	97	97	91	95	91				100	
cM capacity (veh/h)	36	55	416	160	57	579	460				1074	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	16	37	43	165	165	830	431					
Volume Left	5	5	43	0	0	0	0					
Volume Right	11	27	0	0	0	0	16					
cSH	93	216	460	1700	1700	1700	1700					
Volume to Capacity	0.17	0.17	0.09	0.10	0.10	0.49	0.25					
Queue Length 95th (ft)	15	15	8	0	0	0	0					
Control Delay (s)	51.7	25.1	13.6	0.0	0.0	0.0	0.0					
Lane LOS	F	D	B									
Approach Delay (s)	51.7	25.1	1.6			0.0						
Approach LOS	F	D										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization		52.8%		ICU Level of Service					A			
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis  
102: Alabama Ave & 8th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	25	965	170	210	165	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	1027	181	223	176	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		350	121			
pX, platoon unblocked				0.94		
vC, conflicting volume	404			859	202	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404			725	202	
tC, single (s)	4.2			7.0	7.1	
tC, 2 stage (s)						
tF (s)	2.3			3.6	3.4	
p0 queue free %	98			45	91	
cM capacity (veh/h)	1123			317	784	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	369	684	121	284	245	
Volume Left	27	0	0	0	176	
Volume Right	0	0	0	223	69	
cSH	1123	1700	1700	1700	382	
Volume to Capacity	0.02	0.40	0.07	0.17	0.64	
Queue Length 95th (ft)	2	0	0	0	107	
Control Delay (s)	0.8	0.0	0.0	0.0	29.8	
Lane LOS	A			D		
Approach Delay (s)	0.3		0.0	29.8		
Approach LOS			D			
<b>Intersection Summary</b>						
Average Delay			4.5			
Intersection Capacity Utilization		62.0%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
105: Alabama Ave & 12th St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	580	60	50	365	10	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	617	64	53	388	11	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	397		518			
pX, platoon unblocked		0.85		0.85	0.85	
vC, conflicting volume		681		949	649	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		535		851	497	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		94		96	94	
cM capacity (veh/h)		873		238	440	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	681	183	259	37		
Volume Left	0	53	0	11		
Volume Right	64	0	0	27		
cSH	1700	873	1700	354		
Volume to Capacity	0.40	0.06	0.15	0.11		
Queue Length 95th (ft)	0	5	0	9		
Control Delay (s)	0.0	3.2	0.0	16.4		
Lane LOS		A		C		
Approach Delay (s)	0.0	1.3		16.4		
Approach LOS				C		
<b>Intersection Summary</b>						
Average Delay		1.0				
Intersection Capacity Utilization		59.0%		ICU Level of Service	B	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
106: Martin Luther King Jr Ave & 4th St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	270	100	410	470	15	265
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	287	106	436	500	16	282
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					5	
Median type	None		None			
Median storage veh)						
Upstream signal (ft)			481			
pX, platoon unblocked						
vC, conflicting volume		394		1463	197	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		394		1463	197	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		62		79	65	
cM capacity (veh/h)		1161		75	814	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	191	202	436	250	250	298
Volume Left	0	0	436	0	0	16
Volume Right	0	106	0	0	0	282
cSH	1700	1700	1161	1700	1700	861
Volume to Capacity	0.11	0.12	0.38	0.15	0.15	0.35
Queue Length 95th (ft)	0	0	44	0	0	39
Control Delay (s)	0.0	0.0	10.0	0.0	0.0	14.6
Lane LOS			A			B
Approach Delay (s)	0.0		4.6		14.6	
Approach LOS					B	
<b>Intersection Summary</b>						
Average Delay			5.3			
Intersection Capacity Utilization		46.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
210: Malcolm X Ave & 7th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	230	395	90	135	10	150	15	0	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	245	420	96	144	11	160	16	0	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total (vph)	676	250	176									
Volume Left (vph)	11	96	160									
Volume Right (vph)	420	11	0									
Hadj (s)	-0.34	0.09	0.22									
Departure Headway (s)	4.5	5.4	6.3									
Degree Utilization, x	0.85	0.37	0.31									
Capacity (veh/h)	783	636	543									
Control Delay (s)	27.0	11.6	12.0									
Approach Delay (s)	27.0	11.6	12.0									
Approach LOS	D	B	B									
Intersection Summary												
Delay				21.1								
HCM Level of Service				C								
Intersection Capacity Utilization			68.7%		ICU Level of Service				C			
Analysis Period (min)				15								

**Alternative 1 and 2 AM**

HCM Signalized Intersection Capacity Analysis  
26: Malcolm X Ave & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	205	155	5	505	10	375	830	15	85	245	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0			3.0		4.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93			1.00		1.00	0.99		1.00	0.90	
Flpb, ped/bikes	0.99	1.00			1.00		0.97	1.00		0.99	1.00	
Fr <sub>t</sub>	1.00	0.85			1.00		1.00	1.00		1.00	0.95	
Fl <sub>t</sub> Protected	0.98	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1633	1336			1734		1711	3497		1663	2894	
Fl <sub>t</sub> Permitted	0.56	1.00			1.00		0.33	1.00		0.20	1.00	
Satd. Flow (perm)	938	1336			1730		587	3497		351	2894	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	144	218	165	5	537	11	399	883	16	90	261	138
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	362	165	0	553	0	399	899	0	90	399	0
Confl. Peds. (#/hr)	64		70	70		64	116		134	134		116
Heavy Vehicles (%)	13%	13%	13%	9%	9%	9%	2%	2%	2%	7%	7%	7%
Turn Type	pm+pt		pm+ov		Perm		pm+pt		pm+pt			
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	39.8	53.5			39.8		40.2	30.4		26.3	21.5	
Effective Green, g (s)	41.8	55.5			41.8		41.2	32.4		30.3	23.5	
Actuated g/C Ratio	0.46	0.62			0.46		0.46	0.36		0.34	0.26	
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	436	883			803		452	1259		217	756	
v/s Ratio Prot		0.03					c0.14	0.26		0.03	0.14	
v/s Ratio Perm		c0.39	0.09		0.32		c0.26			0.11		
v/c Ratio		0.83	0.19		0.69		0.88	0.71		0.41	0.53	
Uniform Delay, d1	21.0	7.5			19.0		18.3	24.8		21.4	28.5	
Progression Factor	1.00	1.00			1.00		1.07	0.63		1.38	1.18	
Incremental Delay, d2	12.6	0.1			2.5		15.5	2.9		1.3	2.6	
Delay (s)	33.6	7.6			21.5		35.1	18.5		30.9	36.2	
Level of Service	C	A			C		D	B		C	D	
Approach Delay (s)	25.5				21.5			23.6			35.3	
Approach LOS	C				C			C			D	
Intersection Summary												
HCM Average Control Delay	25.5				HCM Level of Service			C				
HCM Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	90.0				Sum of lost time (s)			7.0				
Intersection Capacity Utilization	98.2%				ICU Level of Service			F				
Analysis Period (min)	15											
c Critical Lane Group												

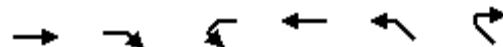
HCM Signalized Intersection Capacity Analysis  
27: Raleigh PI & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	WBL	WBR	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations								
Volume (vph)	15	105	25	150	965	0	45	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		3.0		3.0	3.0
Lane Util. Factor	1.00		1.00		0.95		1.00	0.95
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Frt	0.88		0.88		1.00		1.00	1.00
Flt Protected	0.99		0.99		1.00		0.95	1.00
Satd. Flow (prot)	1571		1652		3505		1671	3343
Flt Permitted	0.99		0.99		1.00		0.17	1.00
Satd. Flow (perm)	1571		1652		3505		300	3343
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	112	27	160	1027	0	48	383
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	128	0	187	0	1027	0	48	383
Confl. Peds. (#/hr)			26					
Heavy Vehicles (%)	6%	6%	1%	1%	3%	3%	8%	8%
Turn Type							D.P+P	
Protected Phases	8		4		2		1	6
Permitted Phases							2	
Actuated Green, G (s)	11.2		13.6		41.5		45.2	50.2
Effective Green, g (s)	12.2		14.6		43.5		49.2	52.2
Actuated g/C Ratio	0.14		0.16		0.48		0.55	0.58
Clearance Time (s)	5.0		5.0		5.0		5.0	5.0
Vehicle Extension (s)	3.0		1.0		1.0		1.0	1.0
Lane Grp Cap (vph)	213		268		1694		251	1939
v/s Ratio Prot	c0.08		c0.11		c0.29		0.01	c0.11
v/s Ratio Perm							0.09	
v/c Ratio	0.60		0.70		0.61		0.19	0.20
Uniform Delay, d1	36.6		35.6		17.0		11.3	9.0
Progression Factor	1.00		1.05		0.80		1.80	1.71
Incremental Delay, d2	4.7		6.2		1.5		0.1	0.2
Delay (s)	41.3		43.5		15.1		20.4	15.6
Level of Service	D		D		B		C	B
Approach Delay (s)	41.3		43.5		15.1			16.1
Approach LOS	D		D		B			B
Intersection Summary								
HCM Average Control Delay		20.2		HCM Level of Service			C	
HCM Volume to Capacity ratio		0.59						
Actuated Cycle Length (s)		90.0		Sum of lost time (s)			14.0	
Intersection Capacity Utilization		63.0%		ICU Level of Service			B	
Analysis Period (min)		15						
c Critical Lane Group								

HCM Signalized Intersection Capacity Analysis  
28: Martin Luther King Jr Ave & Alabama Ave

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (vph)	890	65	50	350	80	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	5.0
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00		0.99	1.00	1.00	1.00
Fr <sub>t</sub>	0.99		1.00	1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3494		1759	3539	3433	1541
Fl <sub>t</sub> Permitted	1.00		0.26	1.00	0.95	1.00
Satd. Flow (perm)	3494		490	3539	3433	1541
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	947	69	53	372	85	80
RTOR Reduction (vph)	7	0	0	0	0	28
Lane Group Flow (vph)	1009	0	53	372	85	52
Confl. Peds. (#/hr)		20	20		20	20
Turn Type			Perm		Perm	
Protected Phases	2		6		4	
Permitted Phases			6		4	
Actuated Green, G (s)	28.9		28.9	28.9	6.1	6.1
Effective Green, g (s)	28.9		28.9	28.9	6.1	6.1
Actuated g/C Ratio	0.64		0.64	0.64	0.14	0.14
Clearance Time (s)	5.0		5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2244		315	2273	465	209
v/s Ratio Prot	c0.29			0.11	0.02	
v/s Ratio Perm			0.11		c0.03	
v/c Ratio	0.45		0.17	0.16	0.18	0.25
Uniform Delay, d <sub>1</sub>	4.0		3.2	3.2	17.2	17.4
Progression Factor	1.03		0.39	0.33	1.04	1.20
Incremental Delay, d <sub>2</sub>	0.6		1.1	0.2	0.2	0.6
Delay (s)	4.8		2.4	1.2	18.1	21.5
Level of Service	A		A	A	B	C
Approach Delay (s)	4.8			1.4	19.7	
Approach LOS	A			A	B	
Intersection Summary						
HCM Average Control Delay		5.4		HCM Level of Service		A
HCM Volume to Capacity ratio		0.42				
Actuated Cycle Length (s)		45.0		Sum of lost time (s)		10.0
Intersection Capacity Utilization		54.2%		ICU Level of Service		A
Analysis Period (min)		15				

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
46: Cypress St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	0	75	130	0	145	10	1045	85	75	250	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00			1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	0.94			1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00			0.95	1.00		0.75	1.00		1.00	1.00	
Fr <sub>t</sub>	0.91			1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected	0.98			0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1586			1711	1587		1307	3390		1687	3341	
Flt Permitted	0.88			0.64	1.00		0.58	1.00		0.19	1.00	
Satd. Flow (perm)	1418			1153	1587		804	3390		331	3341	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	37	0	80	138	0	154	11	1112	90	80	266	5
RTOR Reduction (vph)	0	60	0	0	69	0	0	6	0	0	1	0
Lane Group Flow (vph)	0	57	0	138	85	0	11	1196	0	80	270	0
Confl. Peds. (#/hr)	4			52	52		4	72		52	52	72
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	4%	4%	4%	7%	7%	7%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	20.6			20.6	20.6		59.4	59.4		59.4	59.4	
Effective Green, g (s)	22.6			22.6	22.6		61.4	61.4		61.4	61.4	
Actuated g/C Ratio	0.25			0.25	0.25		0.68	0.68		0.68	0.68	
Clearance Time (s)	5.0			5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	356			290	399		549	2313		226	2279	
v/s Ratio Prot					0.05			c0.35			0.08	
v/s Ratio Perm	0.04			c0.12			0.01			0.24		
v/c Ratio	0.16			0.48	0.21		0.02	0.52		0.35	0.12	
Uniform Delay, d1	26.3			28.7	26.7		4.6	7.0		6.0	4.9	
Progression Factor	1.00			1.00	1.00		0.43	0.37		2.05	1.25	
Incremental Delay, d2	0.2			1.2	0.3		0.1	0.7		4.3	0.1	
Delay (s)	26.5			29.9	26.9		2.0	3.3		16.6	6.3	
Level of Service	C			C	C		A	A		B	A	
Approach Delay (s)	26.5				28.3			3.3			8.6	
Approach LOS	C				C			A			A	
Intersection Summary												
HCM Average Control Delay	9.3			HCM Level of Service				A				
HCM Volume to Capacity ratio	0.51											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)				6.0				
Intersection Capacity Utilization	95.2%			ICU Level of Service				F				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
48: Pecan St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	95	355	1165	60	290	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fr <sub>t</sub>	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1599	3446		1612	3223
Flt Permitted	0.95	1.00	1.00		0.10	1.00
Satd. Flow (perm)	1787	1599	3446		174	3223
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	101	378	1239	64	309	250
RTOR Reduction (vph)	0	11	4	0	0	0
Lane Group Flow (vph)	101	367	1299	0	309	250
Heavy Vehicles (%)	1%	1%	4%	4%	12%	12%
Turn Type	pm+ov			D.P+P		
Protected Phases	3	1	2		1	1 2
Permitted Phases		3	2		2	
Actuated Green, G (s)	20.0	36.1	38.9		55.0	60.0
Effective Green, g (s)	20.0	36.1	38.9		55.0	60.0
Actuated g/C Ratio	0.22	0.40	0.43		0.61	0.67
Clearance Time (s)	5.0	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	397	730	1489		364	2149
v/s Ratio Prot	0.06	c0.09	c0.38		c0.15	0.08
v/s Ratio Perm		0.14			0.37	
v/c Ratio	0.25	0.50	0.87		0.85	0.12
Uniform Delay, d1	28.9	20.2	23.3		23.8	5.4
Progression Factor	1.00	0.97	1.24		0.39	0.67
Incremental Delay, d2	1.5	0.5	7.0		15.5	0.0
Delay (s)	30.5	20.1	35.7		24.8	3.7
Level of Service	C	C	D		C	A
Approach Delay (s)	22.3		35.7		15.3	
Approach LOS	C		D		B	
<b>Intersection Summary</b>						
HCM Average Control Delay		28.1	HCM Level of Service		C	
HCM Volume to Capacity ratio		0.74				
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		10.0	
Intersection Capacity Utilization		67.9%	ICU Level of Service		C	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis  
201: Pecan St & Sycamore St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↙	↖	↗
Volume (vph)	160	190	0	330	120	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	
Flt Protected	1.00	1.00		1.00	0.95	
Satd. Flow (prot)	1801	1531		1801	1805	
Flt Permitted	1.00	1.00		1.00	0.95	
Satd. Flow (perm)	1801	1531		1801	1805	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	170	202	0	351	128	0
RTOR Reduction (vph)	0	63	0	0	0	0
Lane Group Flow (vph)	170	139	0	351	128	0
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Turn Type		Perm	Perm			
Protected Phases	4			4	5	
Permitted Phases		4	4			
Actuated Green, G (s)	62.0	62.0		62.0	18.0	
Effective Green, g (s)	62.0	62.0		62.0	18.0	
Actuated g/C Ratio	0.69	0.69		0.69	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1241	1055		1241	361	
v/s Ratio Prot	0.09		c0.19	c0.07		
v/s Ratio Perm		0.09				
v/c Ratio	0.14	0.13		0.28	0.35	
Uniform Delay, d <sub>1</sub>	4.8	4.8		5.4	31.0	
Progression Factor	0.30	0.04		1.00	1.00	
Incremental Delay, d <sub>2</sub>	0.1	0.2		0.6	0.6	
Delay (s)	1.6	0.3		6.0	31.6	
Level of Service	A	A		A	C	
Approach Delay (s)	0.9			6.0	31.6	
Approach LOS	A			A	C	
<b>Intersection Summary</b>						
HCM Average Control Delay		7.6		HCM Level of Service		A
HCM Volume to Capacity ratio		0.30				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		10.0
Intersection Capacity Utilization		37.5%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

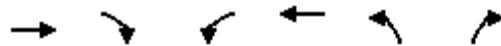
HCM Signalized Intersection Capacity Analysis  
29: Alabama Ave & Randle PI

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	50	25	10	150	120	0	15	5	35	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0	5.0		5.0			5.0	
Lane Util. Factor	0.95				1.00	1.00		1.00			1.00	
Frpb, ped/bikes	0.91				1.00	0.53		0.99			0.98	
Flpb, ped/bikes	0.87				0.98	1.00		1.00			1.00	
Fr <sub>t</sub>	0.97				1.00	0.85		0.97			0.99	
Flt Protected	0.98				1.00	1.00		1.00			0.96	
Satd. Flow (prot)	2732				1854	855		1817			1642	
Flt Permitted	0.84				0.99	1.00		1.00			0.96	
Satd. Flow (perm)	2330				1833	855		1817			1642	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	43	53	27	11	160	128	0	16	5	37	5	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	123	0	0	171	128	0	21	0	0	47	0
Confl. Peds. (#/hr)	92		78	78		92	126		6	6		126
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	7%	7%	7%	
Turn Type	Perm		Perm		Perm		Split			Split		
Protected Phases		2			6			7	7		8	8
Permitted Phases	2			6		6						
Actuated Green, G (s)	63.3			63.3	63.3			3.1			5.6	
Effective Green, g (s)	64.3			64.3	64.3			4.1			6.6	
Actuated g/C Ratio	0.71			0.71	0.71			0.05			0.07	
Clearance Time (s)	6.0			6.0	6.0			6.0			6.0	
Vehicle Extension (s)	1.0			1.0	1.0			3.0			3.0	
Lane Grp Cap (vph)	1665			1310	611			83			120	
v/s Ratio Prot							c0.01			c0.03		
v/s Ratio Perm	0.05			0.09	c0.15							
v/c Ratio	0.07			0.13	0.21			0.25			0.39	
Uniform Delay, d1	3.9			4.0	4.3			41.5			39.8	
Progression Factor	1.19			0.38	0.36			1.00			0.75	
Incremental Delay, d2	0.1			0.2	0.6			1.6			2.1	
Delay (s)	4.7			1.7	2.1			43.1			32.1	
Level of Service	A			A	A			D			C	
Approach Delay (s)	4.7			1.9				43.1			32.1	
Approach LOS	A			A				D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay	7.3				HCM Level of Service			A				
HCM Volume to Capacity ratio	0.23											
Actuated Cycle Length (s)	90.0				Sum of lost time (s)			15.0				
Intersection Capacity Utilization	40.9%				ICU Level of Service			A				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
30: Alabama Ave & Wheeler Rd

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖↑	↖	↗
Volume (vph)	215	90	25	385	650	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00	1.00		1.00	0.95	1.00
Satd. Flow (prot)	1845	1568		2942	1752	1568
Fl <sub>t</sub> Permitted	1.00	1.00		0.93	0.95	1.00
Satd. Flow (perm)	1845	1568		2755	1752	1568
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	229	96	27	410	691	48
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	229	96	0	437	691	48
Confl. Peds. (#/hr)		32	32		2	8
Heavy Vehicles (%)	3%	3%	22%	22%	3%	3%
Turn Type	custom	pm+pt			pt+ov	
Protected Phases	4 5	2 5	3	8	2	2 3
Permitted Phases			8			
Actuated Green, G (s)	26.0	54.0		37.0	43.0	54.0
Effective Green, g (s)	28.0	55.0		39.0	45.0	56.0
Actuated g/C Ratio	0.31	0.61		0.43	0.50	0.62
Clearance Time (s)				5.0	5.0	
Lane Grp Cap (vph)	574	958		1210	876	976
v/s Ratio Prot	c0.12	0.06		c0.03	c0.39	0.03
v/s Ratio Perm				c0.12		
v/c Ratio	0.40	0.10		0.36	0.79	0.05
Uniform Delay, d <sub>1</sub>	24.4	7.2		17.1	18.6	6.6
Progression Factor	0.58	2.95		0.72	1.00	1.00
Incremental Delay, d <sub>2</sub>	1.8	0.2		0.8	7.1	0.1
Delay (s)	16.0	21.6		13.2	25.7	6.7
Level of Service	B	C		B	C	A
Approach Delay (s)	17.6			13.2	24.5	
Approach LOS	B			B	C	
<b>Intersection Summary</b>						
HCM Average Control Delay		19.7		HCM Level of Service		B
HCM Volume to Capacity ratio		0.59				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		69.9%		ICU Level of Service		C
Analysis Period (min)		15				

c Critical Lane Group

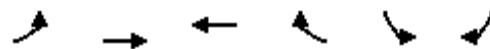
# HCM Signalized Intersection Capacity Analysis

32: Alabama Ave & 13th St

CH2M HILL

12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	140	20	55	290	390	30	260	120	175	10	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	3.0	4.0	3.5	3.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.70	1.00	1.00			0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	0.85	1.00			0.99		1.00	1.00	
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	0.91			0.96		1.00	0.88	
Fl <sub>t</sub> Protected	0.95	1.00	1.00	0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1641	1727	1032	1361	2920			1627		1719	1589	
Fl <sub>t</sub> Permitted	0.24	1.00	1.00	0.66	1.00			0.98		0.33	1.00	
Satd. Flow (perm)	418	1727	1032	948	2920			1595		602	1589	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	138	149	21	59	309	415	32	277	128	186	11	48
RTOR Reduction (vph)	0	0	11	0	219	0	0	20	0	0	32	0
Lane Group Flow (vph)	138	149	10	59	505	0	0	417	0	186	27	0
Confl. Peds. (#/hr)				88	88			188		40		
Heavy Vehicles (%)	10%	10%	10%	13%	13%	13%	7%	7%	7%	5%	5%	5%
Turn Type	pm+pt		Perm	pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	49.6	40.9	40.9	42.8	37.0			29.3		29.3	29.3	
Effective Green, g (s)	49.6	42.9	41.9	43.8	39.0			29.3		29.3	29.3	
Actuated g/C Ratio	0.55	0.48	0.47	0.49	0.43			0.33		0.33	0.33	
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	349	823	480	490	1265			519		196	517	
v/s Ratio Prot	c0.04	0.09		0.01	0.17						0.02	
v/s Ratio Perm	c0.18		0.01	0.05			0.26			c0.31		
v/c Ratio	0.40	0.18	0.02	0.12	0.40			0.80		0.95	0.05	
Uniform Delay, d <sub>1</sub>	11.4	13.5	13.0	12.4	17.5			27.7		29.6	20.8	
Progression Factor	0.99	0.69	0.65	0.82	0.62			1.00		0.96	1.00	
Incremental Delay, d <sub>2</sub>	0.7	0.5	0.1	0.1	0.9			8.8		49.0	0.0	
Delay (s)	12.0	9.8	8.6	10.2	11.7			36.5		77.4	20.8	
Level of Service	B	A	A	B	B			D		E	C	
Approach Delay (s)		10.7			11.6			36.5			63.7	
Approach LOS		B			B			D			E	
<b>Intersection Summary</b>												
HCM Average Control Delay		24.8			HCM Level of Service			C				
HCM Volume to Capacity ratio		0.63										
Actuated Cycle Length (s)		90.0			Sum of lost time (s)			15.0				
Intersection Capacity Utilization		76.9%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	15	75	255	410	285	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0		
Lane Util. Factor	0.95	1.00		1.00		
Fr <sub>t</sub>	1.00	0.92		0.99		
Flt Protected	0.99	1.00		0.96		
Satd. Flow (prot)	3346	1659		1727		
Flt Permitted	0.86	1.00		0.96		
Satd. Flow (perm)	2904	1659		1727		
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	80	271	436	303	27
RTOR Reduction (vph)	0	0	65	0	4	0
Lane Group Flow (vph)	0	96	642	0	327	0
Heavy Vehicles (%)	7%	7%	5%	5%	4%	4%
Turn Type	Perm					
Protected Phases		2	6		8	
Permitted Phases		2				
Actuated Green, G (s)	53.0	53.0		27.0		
Effective Green, g (s)	53.0	53.0		27.0		
Actuated g/C Ratio	0.59	0.59		0.30		
Clearance Time (s)	5.0	5.0		5.0		
Lane Grp Cap (vph)	1710	977		518		
v/s Ratio Prot		c0.39		c0.19		
v/s Ratio Perm	0.03					
v/c Ratio	0.06	0.66		0.63		
Uniform Delay, d1	7.9	12.4		27.2		
Progression Factor	0.54	1.30		1.00		
Incremental Delay, d2	0.1	2.7		5.7		
Delay (s)	4.3	18.8		32.9		
Level of Service	A	B		C		
Approach Delay (s)	4.3	18.8		32.9		
Approach LOS	A	B		C		
<b>Intersection Summary</b>						
HCM Average Control Delay	21.7	HCM Level of Service		C		
HCM Volume to Capacity ratio	0.65					
Actuated Cycle Length (s)	90.0	Sum of lost time (s)		10.0		
Intersection Capacity Utilization	64.2%	ICU Level of Service		C		
Analysis Period (min)	15					
c Critical Lane Group						

## HCM Signalized Intersection Capacity Analysis

105: Alabama Ave &amp; 12th St

CH2M HILL

12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	225	10	15	340	10	40	25	60	5	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0			5.0			5.0	
Lane Util. Factor	1.00				0.95			1.00			1.00	
Fr <sub>t</sub>	1.00				1.00			0.94			0.93	
Flt Protected	0.99				1.00			0.98			0.98	
Satd. Flow (prot)	1829				3517			1715			1695	
Flt Permitted	0.81				0.94			0.89			0.85	
Satd. Flow (perm)	1495				3309			1549			1478	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	101	239	11	16	362	11	43	27	64	5	0	5
RTOR Reduction (vph)	0	1	0	0	3	0	0	54	0	0	4	0
Lane Group Flow (vph)	0	350	0	0	386	0	0	80	0	0	6	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	28.3			28.3			6.7			6.7		
Effective Green, g (s)	28.3			28.3			6.7			6.7		
Actuated g/C Ratio	0.63			0.63			0.15			0.15		
Clearance Time (s)	5.0			5.0			5.0			5.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	940			2081			231			220		
v/s Ratio Prot												
v/s Ratio Perm	c0.23			0.12			c0.05			0.00		
v/c Ratio	0.37			0.19			0.34			0.03		
Uniform Delay, d1	4.0			3.5			17.2			16.4		
Progression Factor	0.51			1.63			1.00			1.00		
Incremental Delay, d2	1.1			0.2			0.9			0.0		
Delay (s)	3.2			5.9			18.1			16.4		
Level of Service	A			A			B			B		
Approach Delay (s)	3.2			5.9			18.1			16.4		
Approach LOS	A			A			B			B		
<b>Intersection Summary</b>												
HCM Average Control Delay	6.8			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.37											
Actuated Cycle Length (s)	45.0			Sum of lost time (s)			10.0					
Intersection Capacity Utilization	48.3%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

## HCM Signalized Intersection Capacity Analysis

CH2M HILL

12/8/2011

126: Dogwood St &amp; 13th St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	15	75	70	5	25	70	655	55	40	85	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0			5.0			5.0	
Lane Util. Factor	1.00				1.00			0.95			0.95	
Fr <sub>t</sub>	0.92				0.97			0.99			0.96	
Flt Protected	0.99				0.97			1.00			0.99	
Satd. Flow (prot)	1565				1721			3419			3211	
Flt Permitted	0.88				0.82			0.91			0.78	
Satd. Flow (perm)	1389				1454			3132			2535	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	37	16	80	74	5	27	74	697	59	43	90	43
RTOR Reduction (vph)	0	67	0	0	23	0	0	8	0	0	16	0
Lane Group Flow (vph)	0	66	0	0	83	0	0	822	0	0	160	0
Heavy Vehicles (%)	10%	10%	10%	3%	3%	3%	4%	4%	4%	7%	7%	7%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	7.2			7.2			27.8			27.8		
Effective Green, g (s)	7.2			7.2			27.8			27.8		
Actuated g/C Ratio	0.16			0.16			0.62			0.62		
Clearance Time (s)	5.0			5.0			5.0			5.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	222			233			1935			1566		
v/s Ratio Prot												
v/s Ratio Perm	0.05			c0.06			c0.26			0.06		
v/c Ratio	0.30			0.36			0.42			0.10		
Uniform Delay, d1	16.7			16.8			4.5			3.5		
Progression Factor	1.00			1.00			0.61			1.00		
Incremental Delay, d2	0.7			0.9			0.6			0.1		
Delay (s)	17.4			17.8			3.3			3.6		
Level of Service	B			B			A			A		
Approach Delay (s)	17.4			17.8			3.3			3.6		
Approach LOS	B			B			A			A		
<b>Intersection Summary</b>												
HCM Average Control Delay	6.1			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.41											
Actuated Cycle Length (s)	45.0			Sum of lost time (s)			10.0					
Intersection Capacity Utilization	51.7%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
21: Lebaum St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	10	15	15	205	55	920	0	0	435	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	0	11	16	16	218	59	979	0	0	463	21
Pedestrians		126			60			28			86	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		10			5			2			7	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								433			535	
pX, platoon unblocked	0.79	0.79		0.79	0.79	0.79					0.79	
vC, conflicting volume	1518	1755	396	1426	1766	635	610				1039	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1126	1426	396	1009	1439	10	610				520	
tC, single (s)	7.5	6.5	6.9	7.6	6.6	7.0	4.2				4.2	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.3	
p0 queue free %	70	100	98	86	80	71	93				100	
cM capacity (veh/h)	54	86	532	116	81	741	845				757	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	27	250	59	489	489	309	176					
Volume Left	16	16	59	0	0	0	0					
Volume Right	11	218	0	0	0	0	21					
cSH	84	397	845	1700	1700	1700	1700					
Volume to Capacity	0.32	0.63	0.07	0.29	0.29	0.18	0.10					
Queue Length 95th (ft)	30	104	6	0	0	0	0					
Control Delay (s)	66.5	28.3	9.6	0.0	0.0	0.0	0.0					
Lane LOS	F	D	A									
Approach Delay (s)	66.5	28.3	0.5			0.0						
Approach LOS	F	D										
Intersection Summary												
Average Delay			5.2									
Intersection Capacity Utilization			51.1%			ICU Level of Service					A	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis  
31: Alabama Ave & 11th Pl

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	295	10	15	370	20	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	314	11	16	394	21	37
Pedestrians	10			4	80	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			0	7	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	752			397		
pX, platoon unblocked						
vC, conflicting volume		404		638	246	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		404		638	246	
tC, single (s)		4.6		6.9	7.0	
tC, 2 stage (s)						
tF (s)		2.5		3.5	3.3	
p0 queue free %		98		94	95	
cM capacity (veh/h)		930		370	699	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	209	115	147	262	59	
Volume Left	0	0	16	0	21	
Volume Right	0	11	0	0	37	
cSH	1700	1700	930	1700	528	
Volume to Capacity	0.12	0.07	0.02	0.15	0.11	
Queue Length 95th (ft)	0	0	1	0	9	
Control Delay (s)	0.0	0.0	1.1	0.0	12.7	
Lane LOS			A		B	
Approach Delay (s)	0.0		0.4		12.7	
Approach LOS					B	
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization	32.6%		ICU Level of Service		A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
102: Alabama Ave & 8th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	
Volume (veh/h)	55	305	655	380	0	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	59	324	697	404	0	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		350	121			
pX, platoon unblocked	0.92			0.92	0.92	
vC, conflicting volume	1101			1178	551	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	929			1013	328	
tC, single (s)	4.2			7.0	7.1	
tC, 2 stage (s)						
tF (s)	2.2			3.6	3.4	
p0 queue free %	91			100	98	
cM capacity (veh/h)	660			183	586	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	167	216	465	637	11	
Volume Left	59	0	0	0	0	
Volume Right	0	0	0	404	11	
cSH	660	1700	1700	1700	586	
Volume to Capacity	0.09	0.13	0.27	0.37	0.02	
Queue Length 95th (ft)	7	0	0	0	1	
Control Delay (s)	4.5	0.0	0.0	0.0	11.3	
Lane LOS	A				B	
Approach Delay (s)	2.0		0.0		11.3	
Approach LOS					B	
<b>Intersection Summary</b>						
Average Delay			0.6			
Intersection Capacity Utilization		53.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
106: Martin Luther King Jr Ave & 4th St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	545	10	110	320	10	410
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	580	11	117	340	11	436
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					5	
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)			481			
pX, platoon unblocked						
vC, conflicting volume		590		989	295	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		590		989	295	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		88		95	38	
cM capacity (veh/h)		981		215	701	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	387	204	117	170	170	447
Volume Left	0	0	117	0	0	11
Volume Right	0	11	0	0	0	436
cSH	1700	1700	981	1700	1700	718
Volume to Capacity	0.23	0.12	0.12	0.10	0.10	0.62
Queue Length 95th (ft)	0	0	10	0	0	109
Control Delay (s)	0.0	0.0	9.2	0.0	0.0	18.3
Lane LOS			A			C
Approach Delay (s)	0.0		2.3		18.3	
Approach LOS					C	
<b>Intersection Summary</b>						
Average Delay			6.2			
Intersection Capacity Utilization		47.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
205: Cypress St & Sycamore St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Sign Control	Stop			Stop			Stop			Stop			
Volume (vph)	25	100	35	15	160	45	105	115	35	20	90	10	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Hourly flow rate (vph)	27	106	37	16	170	48	112	122	37	21	96	11	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	80	90	101	133	271	128							
Volume Left (vph)	27	0	16	0	112	21							
Volume Right (vph)	0	37	0	48	37	11							
Hadj (s)	0.20	-0.25	0.11	-0.22	0.03	0.02							
Departure Headway (s)	6.1	5.7	6.0	5.6	5.2	5.4							
Degree Utilization, x	0.14	0.14	0.17	0.21	0.39	0.19							
Capacity (veh/h)	541	585	563	597	647	610							
Control Delay (s)	8.9	8.4	9.0	8.9	11.5	9.7							
Approach Delay (s)	8.7		8.9		11.5	9.7							
Approach LOS	A		A		B	A							
Intersection Summary													
Delay	9.9												
HCM Level of Service	A												
Intersection Capacity Utilization	41.6%		ICU Level of Service				A						
Analysis Period (min)	15												

HCM Unsignalized Intersection Capacity Analysis  
206: Cypress St & 13th St

CH2M HILL  
12/8/2011



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑		↑↑	↑↑	
Sign Control	Stop			Stop	Stop	
Volume (vph)	30	125	220	340	80	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	32	133	234	362	85	0
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	32	133	355	241	57	28
Volume Left (vph)	32	0	234	0	0	0
Volume Right (vph)	0	133	0	0	0	0
Hadj (s)	0.53	-0.67	0.36	0.03	0.03	0.03
Departure Headway (s)	6.6	5.4	5.4	5.1	5.7	5.7
Degree Utilization, x	0.06	0.20	0.54	0.34	0.09	0.04
Capacity (veh/h)	507	618	650	687	603	603
Control Delay (s)	8.8	8.5	13.3	9.5	8.0	7.7
Approach Delay (s)	8.6		11.8		7.9	
Approach LOS	A		B		A	
Intersection Summary						
Delay	10.8					
HCM Level of Service	B					
Intersection Capacity Utilization	29.1%		ICU Level of Service			A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
207: 8th St & Sycamore St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop				Stop			Stop			Stop
Volume (vph)	60	20	10	0	10	95	0	100	80	55	85	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	64	21	11	0	11	101	0	106	85	59	90	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	96	112	191	149								
Volume Left (vph)	64	0	0	59								
Volume Right (vph)	11	101	85	0								
Hadj (s)	0.10	-0.51	-0.23	0.11								
Departure Headway (s)	4.9	4.3	4.4	4.7								
Degree Utilization, x	0.13	0.13	0.23	0.20								
Capacity (veh/h)	670	761	784	716								
Control Delay (s)	8.7	8.0	8.7	8.9								
Approach Delay (s)	8.7	8.0	8.7	8.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay					8.6							
HCM Level of Service					A							
Intersection Capacity Utilization			41.8%			ICU Level of Service						A
Analysis Period (min)					15							

HCM Unsignalized Intersection Capacity Analysis  
210: Malcolm X Ave & 7th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	35	260	50	250	80	270	145	10	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	37	277	53	266	85	287	154	11	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total (vph)	324	404	452									
Volume Left (vph)	11	53	287									
Volume Right (vph)	277	85	11									
Hadj (s)	-0.47	-0.07	0.15									
Departure Headway (s)	5.7	5.9	6.1									
Degree Utilization, x	0.51	0.66	0.76									
Capacity (veh/h)	596	584	572									
Control Delay (s)	14.4	19.7	25.8									
Approach Delay (s)	14.4	19.7	25.8									
Approach LOS	B	C	D									
Intersection Summary												
Delay				20.6								
HCM Level of Service					C							
Intersection Capacity Utilization				71.2%		ICU Level of Service				C		
Analysis Period (min)					15							

HCM Unsignalized Intersection Capacity Analysis  
211: Malcom X Ave & 8th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop				Stop			Stop			Stop
Volume (vph)	15	25	5	0	20	0	355	75	5	0	5	5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	27	5	0	21	0	378	80	5	0	5	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	48	21	463	11								
Volume Left (vph)	16	0	378	0								
Volume Right (vph)	5	0	5	5								
Hadj (s)	0.03	0.03	0.19	-0.27								
Departure Headway (s)	5.1	5.1	4.3	4.3								
Degree Utilization, x	0.07	0.03	0.55	0.01								
Capacity (veh/h)	646	636	828	793								
Control Delay (s)	8.4	8.2	12.4	7.4								
Approach Delay (s)	8.4	8.2	12.4	7.4								
Approach LOS	A	A	B	A								
Intersection Summary												
Delay					11.8							
HCM Level of Service					B							
Intersection Capacity Utilization			46.4%			ICU Level of Service				A		
Analysis Period (min)					15							

HCM Unsignalized Intersection Capacity Analysis  
 212: Dogwood St & Malcom X Ave

CH2M HILL  
 12/8/2011



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑ ↗			↖ ↗	↖ ↗	
Sign Control	Stop			Stop	Stop	
Volume (vph)	95	0	20	175	5	25
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	101	0	21	186	5	27
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total (vph)	101	207	32			
Volume Left (vph)	0	21	5			
Volume Right (vph)	0	0	27			
Hadj (s)	0.03	0.05	-0.43			
Departure Headway (s)	4.2	4.1	4.1			
Degree Utilization, x	0.12	0.24	0.04			
Capacity (veh/h)	838	861	805			
Control Delay (s)	7.8	8.4	7.3			
Approach Delay (s)	7.8	8.4	7.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.1			
HCM Level of Service			A			
Intersection Capacity Utilization		27.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
213: Dogwood St & 12th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	95	5	0	85	30	110	0	20	10	5	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	21	101	5	0	90	32	117	0	21	11	5	0
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	128	122	138	16								
Volume Left (vph)	21	0	117	11								
Volume Right (vph)	5	32	21	0								
Hadj (s)	0.04	-0.12	0.11	0.17								
Departure Headway (s)	4.5	4.3	4.6	4.8								
Degree Utilization, x	0.16	0.15	0.18	0.02								
Capacity (veh/h)	775	793	741	692								
Control Delay (s)	8.3	8.0	8.6	7.9								
Approach Delay (s)	8.3	8.0	8.6	7.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay					8.3							
HCM Level of Service					A							
Intersection Capacity Utilization				29.0%		ICU Level of Service				A		
Analysis Period (min)					15							

**Alternative 1 and 2 PM**

HCM Signalized Intersection Capacity Analysis  
26: Malcolm X Ave & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	325	380	25	220	10	305	150	55	105	665	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0			4.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00			1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00			1.00	0.86		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		1.00			1.00	1.00		0.78	1.00	
Fr <sub>t</sub>	1.00	0.85		0.99			1.00	0.96		1.00	0.99	
Flt Protected	0.98	1.00		1.00			0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1758	1447		1814			1736	2865		1298	3234	
Flt Permitted	0.72	1.00		0.92			0.15	1.00		0.61	1.00	
Satd. Flow (perm)	1293	1447		1686			281	2865		840	3234	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	223	346	404	27	234	11	324	160	59	112	707	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	569	404	0	272	0	324	219	0	112	766	0
Confl. Peds. (#/hr)	64		70	70		64	116		134	134		116
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	4%	4%	4%	8%	8%	8%
Turn Type	pm+pt		pm+ov	Perm		pm+pt		pm+pt		pm+pt		
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	41.7	54.0		41.7		38.3	28.5		25.8	21.0		
Effective Green, g (s)	43.7	56.0		43.7		39.3	30.5		29.8	23.0		
Actuated g/C Ratio	0.49	0.62		0.49		0.44	0.34		0.33	0.26		
Clearance Time (s)	5.0	5.0		5.0		5.0	5.0		5.0	5.0		
Vehicle Extension (s)	3.0	3.0		3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	628	965		819		338	971		313	826		
v/s Ratio Prot		0.06				c0.14	0.08		0.03	0.24		
v/s Ratio Perm		c0.44	0.22		0.16		c0.28			0.09		
v/c Ratio		0.91	0.42		0.33		0.96	0.23		0.36	0.93	
Uniform Delay, d1	21.3	8.7		14.2		23.0	21.3		22.0	32.7		
Progression Factor	0.30	0.16		1.00		0.52	0.53		0.41	0.53		
Incremental Delay, d2	14.8	0.3		0.2		37.2	0.5		0.7	17.4		
Delay (s)	21.2	1.7		14.4		49.2	11.9		9.7	34.7		
Level of Service	C	A		B		D	B		A	C		
Approach Delay (s)	13.1			14.4			34.1			31.5		
Approach LOS	B			B			C			C		
<b>Intersection Summary</b>												
HCM Average Control Delay	23.6									C		
HCM Volume to Capacity ratio	0.92											
Actuated Cycle Length (s)	90.0									7.0		
Intersection Capacity Utilization	95.9%									F		
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
27: Raleigh PI & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	WBL	WBR	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations								
Volume (vph)	30	20	15	35	455	0	205	865
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		3.0		3.0	3.0
Lane Util. Factor	1.00		1.00		0.95		1.00	0.95
Frpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00		1.00	1.00
Frt	0.95		0.91		1.00		1.00	1.00
Flt Protected	0.97		0.99		1.00		0.95	1.00
Satd. Flow (prot)	1679		1695		3471		1719	3438
Flt Permitted	0.97		0.99		1.00		0.44	1.00
Satd. Flow (perm)	1679		1695		3471		789	3438
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	21	16	37	484	0	218	920
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	53	0	53	0	484	0	218	920
Confl. Peds. (#/hr)				26				
Heavy Vehicles (%)	4%	4%	0%	0%	4%	4%	5%	5%
Turn Type							D.P+P	
Protected Phases	8		4		2		1	6
Permitted Phases							2	
Actuated Green, G (s)	5.8		4.6		45.6		59.6	64.6
Effective Green, g (s)	6.8		5.6		47.6		63.6	66.6
Actuated g/C Ratio	0.08		0.06		0.53		0.71	0.74
Clearance Time (s)	5.0		5.0		5.0		5.0	5.0
Vehicle Extension (s)	3.0		1.0		1.0		1.0	1.0
Lane Grp Cap (vph)	127		105		1836		723	2544
v/s Ratio Prot	c0.03		c0.03		0.14		0.05	c0.27
v/s Ratio Perm							0.16	
v/c Ratio	0.42		0.50		0.26		0.30	0.36
Uniform Delay, d1	39.7		40.9		11.6		6.9	4.2
Progression Factor	1.00		1.20		0.97		0.61	0.60
Incremental Delay, d2	2.2		1.4		0.3		0.1	0.3
Delay (s)	41.9		50.3		11.6		4.2	2.8
Level of Service	D		D		B		A	A
Approach Delay (s)	41.9		50.3		11.6			3.0
Approach LOS	D		D		B			A
Intersection Summary								
HCM Average Control Delay		8.1		HCM Level of Service			A	
HCM Volume to Capacity ratio		0.38						
Actuated Cycle Length (s)		90.0		Sum of lost time (s)			11.0	
Intersection Capacity Utilization		47.3%		ICU Level of Service			A	
Analysis Period (min)		15						
c Critical Lane Group								

HCM Signalized Intersection Capacity Analysis  
28: Martin Luther King Jr Ave & Alabama Ave

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (vph)	325	210	125	785	30	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	5.0
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frpb, ped/bikes	0.98		1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00		0.99	1.00	1.00	1.00
Fr <sub>t</sub>	0.94		1.00	1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3281		1698	3438	3433	1541
Fl <sub>t</sub> Permitted	1.00		0.44	1.00	0.95	1.00
Satd. Flow (perm)	3281		783	3438	3433	1541
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	346	223	133	835	32	138
RTOR Reduction (vph)	78	0	0	0	0	121
Lane Group Flow (vph)	491	0	133	835	32	17
Confl. Peds. (#/hr)		20	20		20	20
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Turn Type		Perm		Perm		
Protected Phases	2		6	4		
Permitted Phases		6		4		
Actuated Green, G (s)	29.3	29.3	29.3	5.7	5.7	
Effective Green, g (s)	29.3	29.3	29.3	5.7	5.7	
Actuated g/C Ratio	0.65	0.65	0.65	0.13	0.13	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2136	510	2239	435	195	
v/s Ratio Prot	0.15		c0.24	0.01		
v/s Ratio Perm		0.17		c0.01		
v/c Ratio	0.23	0.26	0.37	0.07	0.09	
Uniform Delay, d <sub>1</sub>	3.2	3.3	3.6	17.3	17.4	
Progression Factor	1.00	0.18	0.21	1.06	3.00	
Incremental Delay, d <sub>2</sub>	0.3	1.2	0.5	0.1	0.2	
Delay (s)	3.5	1.8	1.2	18.5	52.2	
Level of Service	A	A	A	B	D	
Approach Delay (s)	3.5		1.3	45.9		
Approach LOS	A		A	D		
Intersection Summary						
HCM Average Control Delay		6.5	HCM Level of Service		A	
HCM Volume to Capacity ratio		0.33				
Actuated Cycle Length (s)		45.0	Sum of lost time (s)		10.0	
Intersection Capacity Utilization		45.8%	ICU Level of Service		A	
Analysis Period (min)		15				
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis  
46: Cypress St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	20	10	185	15	130	25	235	100	300	630	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00			1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	0.97			1.00	0.98		1.00	0.95		1.00	1.00	
Flpb, ped/bikes	1.00			0.93	1.00		0.89	1.00		0.91	1.00	
Fr <sub>t</sub>	0.95			1.00	0.87		1.00	0.96		1.00	1.00	
Flt Protected	1.00			0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1631			1559	1499		1504	3065		1605	3526	
Flt Permitted	1.00			0.74	1.00		0.37	1.00		0.54	1.00	
Satd. Flow (perm)	1631			1208	1499		583	3065		904	3526	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	21	11	197	16	138	27	250	106	319	670	5
RTOR Reduction (vph)	0	8	0	0	102	0	0	34	0	0	1	0
Lane Group Flow (vph)	0	24	0	197	52	0	27	322	0	319	674	0
Confl. Peds. (#/hr)	4			52	52		4	72		52	52	72
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	7%	7%	7%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	21.2			21.2	21.2		58.8	58.8		58.8	58.8	
Effective Green, g (s)	23.2			23.2	23.2		60.8	60.8		60.8	60.8	
Actuated g/C Ratio	0.26			0.26	0.26		0.68	0.68		0.68	0.68	
Clearance Time (s)	5.0			5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	420			311	386		394	2071		611	2382	
v/s Ratio Prot	0.01				0.03			0.10			0.19	
v/s Ratio Perm		c0.16				0.05			c0.35			
v/c Ratio	0.06			0.63	0.13		0.07	0.16		0.52	0.28	
Uniform Delay, d1	25.2			29.6	25.7		5.0	5.3		7.3	5.9	
Progression Factor	1.00			1.00	1.00		0.50	0.27		3.56	3.61	
Incremental Delay, d2	0.1			4.2	0.2		0.3	0.1		3.1	0.3	
Delay (s)	25.2			33.8	25.8		2.8	1.6		29.1	21.4	
Level of Service	C			C	C		A	A		C	C	
Approach Delay (s)	25.2				30.3			1.7			23.9	
Approach LOS	C				C			A			C	
Intersection Summary												
HCM Average Control Delay	20.4			HCM Level of Service				C				
HCM Volume to Capacity ratio	0.55											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)				6.0				
Intersection Capacity Utilization	61.2%			ICU Level of Service				B				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
48: Pecan St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↑	↑	↑↑		↑	↑↑
Volume (vph)	30	435	265	100	545	905
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fr <sub>t</sub>	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1736	1553	3176		1703	3406
Flt Permitted	0.95	1.00	1.00		0.47	1.00
Satd. Flow (perm)	1736	1553	3176		844	3406
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	463	282	106	580	963
RTOR Reduction (vph)	0	118	39	0	0	0
Lane Group Flow (vph)	32	345	349	0	580	963
Heavy Vehicles (%)	4%	4%	9%	9%	6%	6%
Turn Type	pm+ov			D.P+P		
Protected Phases	3	1	2		1	1 2
Permitted Phases		3	2		2	
Actuated Green, G (s)	18.0	46.2	28.8		57.0	62.0
Effective Green, g (s)	18.0	46.2	28.8		57.0	62.0
Actuated g/C Ratio	0.20	0.51	0.32		0.63	0.69
Clearance Time (s)	5.0	5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	347	883	1016		804	2346
v/s Ratio Prot	0.02	c0.12	0.11		c0.23	0.28
v/s Ratio Perm		0.10			c0.23	
v/c Ratio	0.09	0.39	0.34		0.72	0.41
Uniform Delay, d1	29.3	13.3	23.4		9.3	6.1
Progression Factor	1.01	0.05	1.04		0.84	0.67
Incremental Delay, d2	0.4	0.2	0.9		0.3	0.0
Delay (s)	30.2	0.9	25.3		8.1	4.1
Level of Service	C	A	C		A	A
Approach Delay (s)	2.8		25.3		5.6	
Approach LOS	A		C		A	
<b>Intersection Summary</b>						
HCM Average Control Delay		8.2	HCM Level of Service		A	
HCM Volume to Capacity ratio		0.66				
Actuated Cycle Length (s)		90.0	Sum of lost time (s)		15.0	
Intersection Capacity Utilization		58.2%	ICU Level of Service		B	
Analysis Period (min)		15				
c Critical Lane Group						



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↙	↖	↗
Volume (vph)	460	185	100	215	250	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	
Fr <sub>t</sub>	1.00	0.85		1.00	0.98	
Flt Protected	1.00	1.00		0.98	0.96	
Satd. Flow (prot)	1837	1531		1808	1783	
Flt Permitted	1.00	1.00		0.73	0.96	
Satd. Flow (perm)	1837	1531		1341	1783	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	489	197	106	229	266	53
RTOR Reduction (vph)	0	74	0	0	8	0
Lane Group Flow (vph)	489	123	0	335	311	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%
Turn Type		Perm	Perm			
Protected Phases	4			4	5	
Permitted Phases		4	4			
Actuated Green, G (s)	56.0	56.0		56.0	24.0	
Effective Green, g (s)	56.0	56.0		56.0	24.0	
Actuated g/C Ratio	0.62	0.62		0.62	0.27	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1143	953		834	475	
v/s Ratio Prot	c0.27			c0.17		
v/s Ratio Perm		0.08		0.25		
v/c Ratio	0.43	0.13		0.40	0.65	
Uniform Delay, d <sub>1</sub>	8.8	7.0		8.6	29.3	
Progression Factor	0.32	0.39		1.00	1.00	
Incremental Delay, d <sub>2</sub>	0.9	0.2		1.4	3.2	
Delay (s)	3.7	3.0		10.0	32.6	
Level of Service	A	A		B	C	
Approach Delay (s)	3.5			10.0	32.6	
Approach LOS	A			B	C	
<b>Intersection Summary</b>						
HCM Average Control Delay		12.1		HCM Level of Service		B
HCM Volume to Capacity ratio		0.50				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		10.0
Intersection Capacity Utilization		70.5%		ICU Level of Service		C
Analysis Period (min)		15				
c Critical Lane Group						

## HCM Signalized Intersection Capacity Analysis

29: Alabama Ave &amp; Randle Pl

CH2M HILL

12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	315	10	5	90	30	10	10	10	125	20	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0			5.0			5.0	
Lane Util. Factor	0.95				0.95			1.00			1.00	
Frpb, ped/bikes	0.99				0.89			0.99			0.93	
Flpb, ped/bikes	0.99				0.99			1.00			1.00	
Fr <sub>t</sub>	1.00				0.96			0.95			0.96	
Flt Protected	1.00				1.00			0.98			0.97	
Satd. Flow (prot)	3183				2800			1762			1570	
Flt Permitted	0.95				0.94			0.98			0.97	
Satd. Flow (perm)	3021				2648			1762			1570	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	335	11	5	96	32	11	11	11	133	21	64
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	357	0	0	133	0	0	33	0	0	218	0
Confl. Peds. (#/hr)	92		78	78		92	126		6	6		126
Heavy Vehicles (%)	10%	10%	10%	9%	9%	9%	0%	0%	0%	5%	5%	5%
Turn Type	Perm		Perm			Split				Split		
Protected Phases		2			6		7	7		8	8	
Permitted Phases	2		6									
Actuated Green, G (s)	49.2				49.2			4.9			17.9	
Effective Green, g (s)	50.2				50.2			5.9			18.9	
Actuated g/C Ratio	0.56				0.56			0.07			0.21	
Clearance Time (s)	6.0				6.0			6.0			6.0	
Vehicle Extension (s)	1.0				1.0			3.0			3.0	
Lane Grp Cap (vph)	1685				1477			116			330	
v/s Ratio Prot							c0.02			c0.14		
v/s Ratio Perm	c0.12				0.05							
v/c Ratio	0.21				0.09			0.28			0.66	
Uniform Delay, d1	10.0				9.3			40.0			32.6	
Progression Factor	0.86				1.06			1.00			0.80	
Incremental Delay, d2	0.3				0.1			1.4			4.8	
Delay (s)	8.9				10.0			41.4			30.9	
Level of Service	A				A			D			C	
Approach Delay (s)	8.9				10.0			41.4			30.9	
Approach LOS	A				A			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay	17.0				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.33											
Actuated Cycle Length (s)	90.0				Sum of lost time (s)			15.0				
Intersection Capacity Utilization	41.4%				ICU Level of Service			A				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
30: Alabama Ave & Wheeler Rd

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗		↖↑	↖	↗
Volume (vph)	460	405	185	170	100	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	3.0	3.0
Lane Util. Factor	1.00	1.00		0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00
Fr <sub>t</sub>	1.00	0.85		1.00	1.00	0.85
Fl <sub>t</sub> Protected	1.00	1.00		0.97	0.95	1.00
Satd. Flow (prot)	1810	1538		3383	1703	1524
Fl <sub>t</sub> Permitted	1.00	1.00		0.54	0.95	1.00
Satd. Flow (perm)	1810	1538		1873	1703	1524
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	489	431	197	181	106	48
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	489	431	0	378	106	48
Confl. Peds. (#/hr)		32	32		2	8
Heavy Vehicles (%)	5%	5%	4%	4%	6%	6%
Turn Type	custom		pm+pt		pt+ov	
Protected Phases	4 5	2 5	3	8	2	2 3
Permitted Phases			8			
Actuated Green, G (s)	39.0	41.0		50.0	30.0	41.0
Effective Green, g (s)	41.0	42.0		52.0	32.0	43.0
Actuated g/C Ratio	0.46	0.47		0.58	0.36	0.48
Clearance Time (s)				5.0	5.0	
Lane Grp Cap (vph)	825	718		1216	606	728
v/s Ratio Prot	c0.27	c0.28		c0.03	0.06	0.03
v/s Ratio Perm			0.15			
v/c Ratio	0.59	0.60		0.31	0.17	0.07
Uniform Delay, d <sub>1</sub>	18.3	17.8		9.8	19.9	12.7
Progression Factor	1.08	0.94		0.71	1.00	1.00
Incremental Delay, d <sub>2</sub>	2.9	3.4		0.6	0.6	0.2
Delay (s)	22.5	20.1		7.6	20.6	12.8
Level of Service	C	C		A	C	B
Approach Delay (s)	21.4			7.6	18.2	
Approach LOS	C			A	B	
<b>Intersection Summary</b>						
HCM Average Control Delay		17.4		HCM Level of Service		B
HCM Volume to Capacity ratio		0.56				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		57.0%		ICU Level of Service		B
Analysis Period (min)		15				

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

32: Alabama Ave & 13th St

CH2M HILL

12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	420	60	160	365	100	15	115	70	265	220	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		3.5	3.0			5.0	4.0	5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96		1.00	1.00			1.00	0.94	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.97	1.00			0.99	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.97			1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1641	3100		1662	3327			1760	1435	1770	1776	
Flt Permitted	0.47	1.00		0.38	1.00			0.94	1.00	0.66	1.00	
Satd. Flow (perm)	814	3100		657	3327			1668	1435	1230	1776	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	48	447	64	170	388	106	16	122	74	282	234	106
RTOR Reduction (vph)	0	10	0	0	21	0	0	0	52	0	21	0
Lane Group Flow (vph)	48	501	0	170	473	0	0	138	22	282	319	0
Confl. Peds. (#/hr)				88	88			188		40		
Heavy Vehicles (%)	10%	10%	10%	5%	5%	5%	6%	6%	6%	2%	2%	2%
Turn Type	pm+pt			pm+pt			Perm		Perm		Perm	
Protected Phases	5	2		1	6			4				8
Permitted Phases	2			6			4		4		8	
Actuated Green, G (s)	45.8	41.6		54.2	46.0			25.8	25.8	25.8	25.8	
Effective Green, g (s)	45.8	43.6		54.7	48.0			25.8	26.8	25.8	25.8	
Actuated g/C Ratio	0.51	0.48		0.61	0.53			0.29	0.30	0.29	0.29	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	453	1502		501	1774			478	427	353	509	
v/s Ratio Prot	0.00	0.16		c0.03	0.14						0.18	
v/s Ratio Perm	0.05			c0.17				0.08	0.02	c0.23		
v/c Ratio	0.11	0.33		0.34	0.27			0.29	0.05	0.80	0.63	
Uniform Delay, d1	11.2	14.3		8.2	11.4			25.0	22.5	29.7	27.9	
Progression Factor	0.72	0.67		0.74	0.83			1.00	1.00	0.91	0.91	
Incremental Delay, d2	0.1	0.6		0.4	0.4			0.3	0.1	11.7	2.4	
Delay (s)	8.1	10.2		6.5	9.9			25.3	22.6	38.7	27.8	
Level of Service	A	B		A	A			C	C	D	C	
Approach Delay (s)		10.0			9.0			24.4			32.7	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			18.0		HCM Level of Service				B			
HCM Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)				8.5			
Intersection Capacity Utilization			58.9%		ICU Level of Service				B			
Analysis Period (min)			15									
c Critical Lane Group												



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	
Volume (vph)	25	425	105	65	365	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0			
Lane Util. Factor	0.95	0.95	1.00			
Fr <sub>t</sub>	1.00	0.94	0.99			
Flt Protected	1.00	1.00	0.95			
Satd. Flow (prot)	3273	3151	1784			
Flt Permitted	0.93	1.00	0.95			
Satd. Flow (perm)	3061	3151	1784			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	452	112	69	388	21
RTOR Reduction (vph)	0	0	43	0	4	0
Lane Group Flow (vph)	0	479	138	0	405	0
Heavy Vehicles (%)	10%	10%	8%	8%	1%	1%
Turn Type	Perm					
Protected Phases		2	6		8	
Permitted Phases	2					
Actuated Green, G (s)	17.0	17.0	18.0			
Effective Green, g (s)	17.0	17.0	18.0			
Actuated g/C Ratio	0.38	0.38	0.40			
Clearance Time (s)	5.0	5.0	5.0			
Lane Grp Cap (vph)	1156	1190	714			
v/s Ratio Prot		0.04	c0.23			
v/s Ratio Perm	c0.16					
v/c Ratio	0.41	0.12	0.57			
Uniform Delay, d1	10.3	9.1	10.5			
Progression Factor	1.08	0.90	1.00			
Incremental Delay, d2	1.1	0.2	3.2			
Delay (s)	12.2	8.4	13.7			
Level of Service	B	A	B			
Approach Delay (s)	12.2	8.4	13.7			
Approach LOS	B	A	B			
<b>Intersection Summary</b>						
HCM Average Control Delay	12.1	HCM Level of Service		B		
HCM Volume to Capacity ratio	0.49					
Actuated Cycle Length (s)	45.0	Sum of lost time (s)		10.0		
Intersection Capacity Utilization	51.4%	ICU Level of Service		A		
Analysis Period (min)	15					
c Critical Lane Group						

## HCM Signalized Intersection Capacity Analysis

105: Alabama Ave &amp; 12th St

CH2M HILL

12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	380	60	50	425	5	10	5	25	120	95	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0			5.0			5.0	
Lane Util. Factor	0.95				0.95			1.00			1.00	
Fr <sub>t</sub>	0.98				1.00			0.92			0.98	
Flt Protected	1.00				0.99			0.99			0.98	
Satd. Flow (prot)	3462				3516			1683			1788	
Flt Permitted	0.93				0.87			0.89			0.82	
Satd. Flow (perm)	3215				3078			1523			1507	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	404	64	53	452	5	11	5	27	128	101	32
RTOR Reduction (vph)	0	21	0	0	1	0	0	20	0	0	14	0
Lane Group Flow (vph)	0	468	0	0	509	0	0	23	0	0	247	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	22.6			22.6			12.4			12.4		
Effective Green, g (s)	22.6			22.6			12.4			12.4		
Actuated g/C Ratio	0.50			0.50			0.28			0.28		
Clearance Time (s)	5.0			5.0			5.0			5.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	1615			1546			420			415		
v/s Ratio Prot												
v/s Ratio Perm	0.15			c0.17			0.02			c0.16		
v/c Ratio	0.29			0.33			0.06			0.60		
Uniform Delay, d1	6.5			6.7			12.0			14.1		
Progression Factor	0.71			0.69			1.00			1.00		
Incremental Delay, d2	0.4			0.6			0.1			2.3		
Delay (s)	5.0			5.2			12.0			16.4		
Level of Service	A			A			B			B		
Approach Delay (s)	5.0			5.2			12.0			16.4		
Approach LOS	A			A			B			B		

## Intersection Summary

HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

## HCM Signalized Intersection Capacity Analysis

CH2M HILL

12/8/2011

126: Dogwood St &amp; 13th St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	15	85	60	5	10	15	150	95	10	440	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0				5.0			5.0			5.0	
Lane Util. Factor	1.00				1.00			0.95			0.95	
Fr <sub>t</sub>	0.90				0.98			0.95			0.96	
Flt Protected	0.99				0.96			1.00			1.00	
Satd. Flow (prot)	1683				1775			3272			3407	
Flt Permitted	0.94				0.83			0.92			0.95	
Satd. Flow (perm)	1590				1531			3014			3238	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	16	16	90	64	5	11	16	160	101	11	468	154
RTOR Reduction (vph)	0	77	0	0	9	0	0	37	0	0	43	0
Lane Group Flow (vph)	0	45	0	0	71	0	0	240	0	0	590	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	4%	4%	4%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	6.7			6.7			28.3			28.3		
Effective Green, g (s)	6.7			6.7			28.3			28.3		
Actuated g/C Ratio	0.15			0.15			0.63			0.63		
Clearance Time (s)	5.0			5.0			5.0			5.0		
Vehicle Extension (s)	3.0			3.0			3.0			3.0		
Lane Grp Cap (vph)	237			228			1895			2036		
v/s Ratio Prot												
v/s Ratio Perm	0.03			c0.05			0.08			c0.18		
v/c Ratio	0.19			0.31			0.13			0.29		
Uniform Delay, d1	16.8			17.1			3.4			3.8		
Progression Factor	1.00			1.00			0.57			1.00		
Incremental Delay, d2	0.4			0.8			0.1			0.4		
Delay (s)	17.2			17.9			2.0			4.2		
Level of Service	B			B			A			A		
Approach Delay (s)	17.2			17.9			2.0			4.2		
Approach LOS	B			B			A			A		
<b>Intersection Summary</b>												
HCM Average Control Delay	6.0			HCM Level of Service			A					
HCM Volume to Capacity ratio	0.29											
Actuated Cycle Length (s)	45.0			Sum of lost time (s)			10.0					
Intersection Capacity Utilization	43.3%			ICU Level of Service			A					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
21: Lebaum St & Martin Luther King Jr Ave

CH2M HILL  
12/8/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	0	10	5	5	25	40	330	0	0	810	15
Sign Control		Stop				Stop			Free			Free
Grade		0%				0%			0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	5	0	11	5	5	27	43	351	0	0	862	16
Pedestrians		126				60			28			86
Lane Width (ft)		12.0				12.0			12.0			12.0
Walking Speed (ft/s)		4.0				4.0			4.0			4.0
Percent Blockage		10				5			2			7
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								433			535	
pX, platoon unblocked	0.95	0.95	0.95	0.95	0.95			0.95				
vC, conflicting volume	1372	1492	593	966	1500	322	1004				411	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1292	1418	475	866	1426	322	906				411	
tC, single (s)	7.8	6.8	7.2	7.7	6.7	7.1	4.2				4.2	
tC, 2 stage (s)												
tF (s)	3.7	4.2	3.5	3.6	4.1	3.4	2.3				2.3	
p0 queue free %	92	100	97	97	94	95	93				100	
cM capacity (veh/h)	65	90	417	167	93	569	616				1054	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2					
Volume Total	16	37	43	176	176	574	303					
Volume Left	5	5	43	0	0	0	0					
Volume Right	11	27	0	0	0	0	16					
cSH	148	274	616	1700	1700	1700	1700					
Volume to Capacity	0.11	0.14	0.07	0.10	0.10	0.34	0.18					
Queue Length 95th (ft)	9	12	6	0	0	0	0					
Control Delay (s)	32.2	20.2	11.3	0.0	0.0	0.0	0.0					
Lane LOS	D	C	B									
Approach Delay (s)	32.2	20.2	1.2			0.0						
Approach LOS	D	C										
Intersection Summary												
Average Delay			1.3									
Intersection Capacity Utilization		49.3%		ICU Level of Service					A			
Analysis Period (min)		15										

HCM Unsignalized Intersection Capacity Analysis  
31: Alabama Ave & 11th Pl

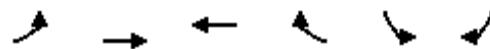
CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	445	40	15	450	25	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	473	43	16	479	27	16
Pedestrians	10			4	80	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			0	7	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	752			397		
pX, platoon unblocked						
vC, conflicting volume		596		856	342	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		596		856	342	
tC, single (s)		4.2		6.9	7.0	
tC, 2 stage (s)						
tF (s)		2.3		3.5	3.3	
p0 queue free %		98		90	97	
cM capacity (veh/h)		886		266	603	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	
Volume Total	316	200	176	319	43	
Volume Left	0	0	16	0	27	
Volume Right	0	43	0	0	16	
cSH	1700	1700	886	1700	337	
Volume to Capacity	0.19	0.12	0.02	0.19	0.13	
Queue Length 95th (ft)	0	0	1	0	11	
Control Delay (s)	0.0	0.0	1.0	0.0	17.2	
Lane LOS			A		C	
Approach Delay (s)	0.0		0.4		17.2	
Approach LOS				C		
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization	34.6%		ICU Level of Service		A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
102: Alabama Ave & 8th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↖	
Volume (veh/h)	25	765	105	165	100	65
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	27	814	112	176	106	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		350	121			
pX, platoon unblocked				0.97		
vC, conflicting volume	287			660	144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	287			575	144	
tC, single (s)	4.2			7.0	7.1	
tC, 2 stage (s)						
tF (s)	2.3			3.6	3.4	
p0 queue free %	98			74	92	
cM capacity (veh/h)	1243			408	856	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	
Volume Total	298	543	74	213	176	
Volume Left	27	0	0	0	106	
Volume Right	0	0	0	176	69	
cSH	1243	1700	1700	1700	514	
Volume to Capacity	0.02	0.32	0.04	0.13	0.34	
Queue Length 95th (ft)	2	0	0	0	38	
Control Delay (s)	0.9	0.0	0.0	0.0	15.6	
Lane LOS	A			C		
Approach Delay (s)	0.3		0.0		15.6	
Approach LOS				C		
<b>Intersection Summary</b>						
Average Delay			2.3			
Intersection Capacity Utilization		49.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
106: Martin Luther King Jr Ave & 4th St

CH2M HILL  
12/8/2011



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	270	100	370	445	15	265
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	287	106	394	473	16	282
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)					5	
Median type	None		None			
Median storage veh)						
Upstream signal (ft)			481			
pX, platoon unblocked						
vC, conflicting volume		394		1364	197	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol		394		1364	197	
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		66		83	65	
cM capacity (veh/h)		1161		92	814	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1
Volume Total	191	202	394	237	237	298
Volume Left	0	0	394	0	0	16
Volume Right	0	106	0	0	0	282
cSH	1700	1700	1161	1700	1700	861
Volume to Capacity	0.11	0.12	0.34	0.14	0.14	0.35
Queue Length 95th (ft)	0	0	38	0	0	39
Control Delay (s)	0.0	0.0	9.7	0.0	0.0	13.9
Lane LOS			A			B
Approach Delay (s)	0.0		4.4		13.9	
Approach LOS					B	
<b>Intersection Summary</b>						
Average Delay			5.1			
Intersection Capacity Utilization		44.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis  
205: Cypress St & Sycamore St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Sign Control	Stop			Stop			Stop			Stop			
Volume (vph)	110	215	95	90	120	5	110	35	5	70	110	100	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Hourly flow rate (vph)	117	229	101	96	128	5	117	37	5	74	117	106	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1							
Volume Total (vph)	231	215	160	69	160	298							
Volume Left (vph)	117	0	96	0	117	74							
Volume Right (vph)	0	101	0	5	5	106							
Hadj (s)	0.29	-0.29	0.33	-0.02	0.16	-0.13							
Departure Headway (s)	6.7	6.1	7.1	6.7	6.5	5.9							
Degree Utilization, x	0.43	0.36	0.31	0.13	0.29	0.49							
Capacity (veh/h)	512	561	472	495	493	568							
Control Delay (s)	13.4	11.3	12.0	9.5	12.2	14.5							
Approach Delay (s)	12.4		11.3		12.2	14.5							
Approach LOS	B		B		B	B							
Intersection Summary													
Delay	12.7												
HCM Level of Service	B												
Intersection Capacity Utilization	48.6%		ICU Level of Service				A						
Analysis Period (min)	15												

HCM Unsignalized Intersection Capacity Analysis  
206: Cypress St & 13th St

CH2M HILL  
12/8/2011



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑		↑↑	↑↑	
Sign Control	Stop			Stop	Stop	
Volume (vph)	15	275	95	235	455	120
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	293	101	250	484	128
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	16	293	184	167	323	289
Volume Left (vph)	16	0	101	0	0	0
Volume Right (vph)	0	293	0	0	0	128
Hadj (s)	0.53	-0.67	0.31	0.03	0.03	-0.28
Departure Headway (s)	7.3	6.1	6.7	6.4	6.1	5.8
Degree Utilization, x	0.03	0.50	0.34	0.30	0.54	0.46
Capacity (veh/h)	459	555	520	540	575	606
Control Delay (s)	9.4	13.9	11.9	10.8	14.9	12.4
Approach Delay (s)	13.6		11.4		13.7	
Approach LOS	B		B		B	
Intersection Summary						
Delay	13.1					
HCM Level of Service	B					
Intersection Capacity Utilization	40.1%		ICU Level of Service			A
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
207: 8th St & Sycamore St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop				Stop			Stop			Stop	
Volume (vph)	40	30	10	65	10	85	0	25	15	75	80	140
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	43	32	11	69	11	90	0	27	16	80	85	149
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	85	170	43	314								
Volume Left (vph)	43	69	0	80								
Volume Right (vph)	11	90	16	149								
Hadj (s)	0.06	-0.20	-0.19	-0.20								
Departure Headway (s)	5.0	4.6	4.7	4.4								
Degree Utilization, x	0.12	0.22	0.06	0.38								
Capacity (veh/h)	655	717	698	779								
Control Delay (s)	8.7	8.9	8.0	10.1								
Approach Delay (s)	8.7	8.9	8.0	10.1								
Approach LOS	A	A	A	B								
Intersection Summary												
Delay					9.4							
HCM Level of Service					A							
Intersection Capacity Utilization				44.3%		ICU Level of Service						A
Analysis Period (min)					15							

HCM Unsignalized Intersection Capacity Analysis  
210: Malcolm X Ave & 7th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	180	295	90	180	10	75	15	0	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	191	314	96	191	11	80	16	0	0	0	0
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total (vph)	516	298	96									
Volume Left (vph)	11	96	80									
Volume Right (vph)	314	11	0									
Hadj (s)	-0.33	0.08	0.20									
Departure Headway (s)	4.2	4.8	5.9									
Degree Utilization, x	0.61	0.40	0.16									
Capacity (veh/h)	824	720	537									
Control Delay (s)	13.5	11.0	9.9									
Approach Delay (s)	13.5	11.0	9.9									
Approach LOS	B	B	A									
Intersection Summary												
Delay												
HCM Level of Service												
Intersection Capacity Utilization				58.1%		ICU Level of Service						
Analysis Period (min)												

HCM Unsignalized Intersection Capacity Analysis  
211: Malcom X Ave & 8th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	60	40	80	0	45	0	170	20	0	0	85	65
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	64	43	85	0	48	0	181	21	0	0	90	69
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	191	48	202	160								
Volume Left (vph)	64	0	181	0								
Volume Right (vph)	85	0	0	69								
Hadj (s)	-0.17	0.03	0.21	-0.23								
Departure Headway (s)	4.7	5.1	4.9	4.5								
Degree Utilization, x	0.25	0.07	0.28	0.20								
Capacity (veh/h)	713	638	696	741								
Control Delay (s)	9.2	8.5	9.8	8.7								
Approach Delay (s)	9.2	8.5	9.8	8.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			9.2									
HCM Level of Service			A									
Intersection Capacity Utilization		45.9%			ICU Level of Service							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis  
 212: Dogwood St & Malcom X Ave

CH2M HILL  
 12/8/2011



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑ ↗			↖ ↗	↖ ↗	
Sign Control	Stop			Stop	Stop	
Volume (vph)	150	5	40	30	10	30
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	160	5	43	32	11	32
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total (vph)	165	74	43			
Volume Left (vph)	0	43	11			
Volume Right (vph)	5	0	32			
Hadj (s)	0.01	0.15	-0.37			
Departure Headway (s)	4.1	4.3	4.1			
Degree Utilization, x	0.19	0.09	0.05			
Capacity (veh/h)	866	820	832			
Control Delay (s)	8.0	7.7	7.3			
Approach Delay (s)	8.0	7.7	7.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.8			
HCM Level of Service			A			
Intersection Capacity Utilization		25.3%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
213: Dogwood St & 12th St

CH2M HILL  
12/8/2011



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	100	70	145	15	5	15	0	15	0	30	40
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	106	74	154	16	5	16	0	16	0	32	43
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	191	176	32	74								
Volume Left (vph)	11	154	16	0								
Volume Right (vph)	74	5	16	43								
Hadj (s)	-0.19	0.19	-0.17	-0.31								
Departure Headway (s)	4.2	4.5	4.7	4.5								
Degree Utilization, x	0.22	0.22	0.04	0.09								
Capacity (veh/h)	836	760	707	738								
Control Delay (s)	8.3	8.8	7.9	7.9								
Approach Delay (s)	8.3	8.8	7.9	7.9								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay					8.4							
HCM Level of Service					A							
Intersection Capacity Utilization				37.6%		ICU Level of Service						
Analysis Period (min)					15							

Int #	Intersection	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement	Intersection	LOS
								Delay (sec/veh)	Delay (sec/veh)	
46	Martin Luther King Jr Ave and Cypress St	Signal	NB	LT	10	13	97%	11	7	A
				TH	965	918				
				RT	0	10				
				Total	975	941				
			EB	LT	50	51	102%	37	0	8
				TH	0	0				
				RT	30	30				
				Total	80	81				
			SB	LT	0	0	105%	0	8	A
				TH	350	372				
				RT	10	7				
				Total	360	379				
			Int	Total	1415	1402	99%			
21	Martin Luther King Jr Ave and Lebaum St	TWSC	NB	LT	30	28	101%	8	4	F
				TH	655	663				
				Total	685	691				
				LT	5	5	101%	20	17	53
			EB	RT	5	5				
				Total	10	10				
				TH	375	395	105%	16	9	F
			SB	RT	5	4				
				Total	380	396				
				LT	15	38				
			WB	TH	10	17	97%	53	32	D
				RT	315	274				
				Total	340	329				
				Int Total	1415	1428	101%			
26	Martin Luther King Jr Ave and Malcolm X Ave	Signal	NB	LT	220	204	98%	84	52	A
				TH	535	531				
				RT	20	21				
				Total	775	757				
			EB	LT	75	73	101%	68	60	B
				TH	155	151				
				RT	90	94				
				Total	320	318				
			SB	LT	105	104	110%	61	51	B
				TH	230	263				
				RT	60	67				
				Total	395	434				
			WB	LT	5	6	106%	27	24	C
				TH	450	476				
				RT	75	83				
				Total	530	564				
			Int Total	2020	2073	103%				
27	Martin Luther King Jr Ave and Randle Pl	Signal	NEB	TH	650	627	96%	115	0	E
				RT	0	0				
				Total	650	627				
			NB	LT	10	10	109%	52	49	B
				RT	60	66				
				Total	70	76				
			SWB	LT	100	115	112%	31	18	D
				TH	225	250				
				Total	325	364				
			WB	Hard LT	0	0	100%	0	38	D
				LT	10	9				
				RT	65	66				
				Total	75	75				
			Int Total	1120	1142	102%				

Int #	Intersection	Traffic Control	Hourly Volume				Intersection Operations			
			Appr	Mvmt	Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	
28	Martin Luther King Jr Ave and Alabama Ave	Signal	NB	TH	650	631	96%	25	24	C
				RT	225	210		6		
				Total	875	841				
				SB	235	258	110%	26		
			WB	Total	235	258				
				LT	225	251	116%	35		
				RT	0	9		54		
				Total	225	260				
			Int	Total	1335	1380	103%			
106	Martin Luther King Jr Ave and 4th St	OWSC	NB	LT	10	10	99%	41	47	E
				TH	0	0		0		
				RT	225	223		47		
				Total	235	232				
			EB	TH	655	633	96%	6		
				RT	10	7		3		
				Total	665	640				
				LT	45	55	111%	8		
			WB	TH	415	454		0		
				Total	460	509				
				Int Total	1360	1381	102%			
29	Alabama Ave and Randle Pl	Signal	NB	LT	0	0	99%	0	17	B
				TH	5	5		48		
				RT	10	10		55		
				Total	15	15				
			EB	LT	10	9	94%	18		
				TH	210	198		12		
				RT	5	4		12		
				Total	225	211				
			SB	LT	70	83	115%	45		
				TH	10	10		44		
				RT	20	21		39		
				Total	100	115				
45	Alabama Ave and 7th St	Signal	WB	LT	10	12	116%	10	16	B
				TH	210	244		9		
				RT	55	62		11		
				Total	275	319				
			Int	Total	615	660	107%			
				LT	10	9	101%	6		
				TH	280	283		7		
				Total	290	292				
102	Alabama Ave and 8th St	OWSC	SB	LT	225	208	93%	45	26	D
				RT	10	11		42		
				Total	235	219				
				TH	265	308	106%	10		
			WB	RT	420	415		12		
				Total	685	723				
				Int Total	1210	1234	102%			
				LT	30	29	97%	26		
			EB	TH	475	463		13		
				Total	505	492				
				LT	0	0	304%	0		
			SB	RT	15	46		17		
				Total	15	46				
				TH	670	678	101%	1		
			WB	RT	510	519		1		
				Total	1180	1197				
			Int	Total	1700	1734	102%			

Int #	Intersection	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
30	Alabama Ave and Wheeler Rd	Signal	NB	LT	645	650	101%	39	25	C
				RT	75	80		19		
				Total	720	730				
			EB	TH	320	318		11		
				RT	155	145		1		
				Total	475	462				
				LT	40	45		32		
			WB	TH	535	549	103%	24		
				Total	575	594				
				Int Total	1770	1786				
31	Alabama Ave and 11th Pl	Signal	NB	LT	20	20	98%	37	17	B
				TH	15	15		34		
				RT	15	15		11		
				Total	50	49				
			EB	LT	80	73		18		
				TH	300	310	101%	11		
				RT	15	14		7		
				Total	395	397				
			SB	LT	25	28	102%	37		
				TH	10	8		36		
				RT	45	45		8		
				Total	80	82				
			WB	LT	15	15	104%	24		
				TH	510	533		18		
				RT	50	48		19		
				Total	575	596				
			Int	Total	1100	1124	102%			
32	Alabama Ave and 13th St	Signal	NB	LT	30	29	104%	24	15	B
				TH	15	19		19		
				RT	45	45		7		
				Total	90	93				
			EB	LT	45	55		17		
				TH	280	285	104%	13		
				RT	15	13		11		
				Total	340	353				
			SB	LT	40	45	111%	34		
				TH	10	10		24		
				RT	35	39		15		
				Total	85	94				
			WB	LT	15	15	101%	14		
				TH	510	518		15		
				RT	50	47		10		
				Total	575	580				
			Int	Total	1090	1121	103%			
223	Malcolm X Ave and 7th St	AWSC	NB	LT	240	253	99%	37	35	E
				TH	185	167		38		
				RT	5	5		37		
				Total	430	424				
			EB	LT	15	34		29		
				TH	50	41	98%	22		
				RT	215	200		21		
				Total	280	275				
			WB	LT	20	18	102%	38		
				TH	290	313		42		
				RT	140	128		39		
				Total	450	459				
			Int	Total	1160	1158	100%			

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
46	Martin Luther King Jr Ave and Cypress St	Signal	NB	LT	10	10	103%	15	8	A
				TH	410	422		7		
				RT	0	0		0		
				Total	420	431				
			EB	LT	20	18	101%	40		
				TH	0	0		0		
				RT	10	13		13		
				Total	30	30				
			SB	LT	0	0	97%	0		
				TH	690	674		8		
				RT	5	3		14		
				Total	695	677				
			Int	Total	1145	1138	99%			
21	Martin Luther King Jr Ave and Lebaum St	TWSC	NB	LT	35	36	104%	9	26	D
				TH	350	363		4		
				Total	385	399				
			EB	LT	5	4	102%	26		
				RT	5	6		25		
				Total	10	10				
			SB	TH	685	671	98%	10		
				RT	15	12		21		
				Total	700	683				
			WB	LT	10	9	100%	19		
				TH	10	10		22		
				RT	65	66		9		
				Total	85	85				
			Int	Total	1180	1177	100%			
26	Martin Luther King Jr Ave and Malcolm X Ave	Signal	NB	LT	175	177	105%	46	70	E
				TH	270	292		23		
				RT	25	24		25		
				Total	470	492				
			EB	LT	60	54	91%	174		
				TH	315	284		201		
				RT	120	114		87		
				Total	495	451				
			SB	LT	210	192	98%	44		
				TH	440	446		42		
				RT	50	46		53		
				Total	700	683				
			WB	LT	15	22	98%	56		
				TH	245	237		49		
				RT	55	51		51		
				Total	315	310				
			Int	Total	1980	1937	98%			
27	Martin Luther King Jr Ave and Randle Pl	Signal	NEB	TH	425	452	105%	21	25	C
				RT	20	15		16		
				Total	445	467				
			NB	LT	10	12	102%	102		
				RT	25	24		68		
				Total	35	36				
			SWB	LT	205	203	101%	37		
				TH	370	379		18		
				Total	575	582				
			WB	Hard LT	0	0	103%	0		
				LT	10	11		25		
				RT	20	20		7		
				Total	30	31				
			Int	Total	1085	1116	103%			

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations					
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS			
28	Martin Luther King Jr Ave and Alabama Ave	Signal	NB	TH	295	311	102%	6	12	B			
				RT	290	287		4					
				Total	585	598							
			SB	TH	390	402	103%	3					
				Total	390	402							
				LT	215	218		42					
	Martin Luther King Jr Ave and 4th St		WB	RT	150	155	102%	20					
				Total	365	373							
				Int Total	1340	1381							
106			NB	LT	20	0	103%	13	13	B			
				TH	0	0		0					
				RT	150	0		11					
				Total	170	175							
			TH	440	453	102%	2						
				RT	20	17	1						
				Total	460	470							
				LT	75	87	5						
			WB	TH	530	533	102%	0					
				Total	605	619							
				Int Total	1235	1265							
29	Alabama Ave and Randle Pl	Signal	NB	LT	5	5	98%	49	22	C			
				TH	5	4		54					
				RT	5	6		48					
				Total	15	15							
			EB	LT	5	6	97%	20					
				TH	280	272		16					
				RT	5	5		15					
				Total	290	282							
			SB	LT	180	175	95%	53					
				TH	5	4		59					
				RT	45	39		50					
				Total	230	218							
			WB	LT	5	5	104%	13					
				TH	320	334		7					
				RT	25	26		9					
				Total	350	364							
				Int Total	885	879							
45	Alabama Ave and 7th St		EB	LT	10	14	98%	20	19	B			
				TH	450	436		14					
				Total	460	451							
			SB	LT	355	308	87%	40					
				RT	10	8		40					
				Total	365	316							
			WB	TH	340	357	102%	10					
				RT	130	124		11					
				Total	470	481							
				Int Total	1295	1248							
102	Alabama Ave and 8th St		EB	LT	10	9	104%	18	136	F			
				TH	705	735		24					
				Total	715	744							
			SB	LT	115	80	87%	136					
				RT	10	29		107					
				Total	125	108							
			WB	TH	460	455	99%	1					
				RT	165	164		2					
				Total	625	619							
				Int Total	1465	1472							

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
30	Alabama Ave and Wheeler Rd	Signal	NB	LT	160	163	102%	45	16	B
				RT	75	78		30		
				Total	235	241				
				TH	520	514		7		
				RT	305	300	99%	18		
			EB	Total	825	814				
				LT	125	130	100%	22		
				TH	465	457		12		
				Total	590	587				
				Int Total	1650	1642	100%			
31	Alabama Ave and 11th Pl	Signal	NB	LT	10	9	98%	46	9	A
				TH	5	4		38		
				RT	25	26		9		
				Total	40	39				
			EB	LT	15	12	100%	14		
				TH	555	557		8		
				RT	25	24		8		
				Total	595	593				
				SB	LT	35	103%	41	9	A
				TH	10	12		37		
				RT	105	104		11		
				Total	150	154				
32	Alabama Ave and 13th St	Signal	NB	LT	10	10	105%	23	30	C
				TH	10	13		29		
				RT	40	40		10		
				Total	60	63				
			EB	LT	50	59	101%	35		
				TH	545	544		35		
				RT	20	19		33		
				Total	615	621				
				SB	LT	35	112%	38	30	C
				TH	10	9		24		
				RT	15	17		15		
				Total	60	67				
223	Malcolm X Ave and 7th St	AWSC	NB	LT	105	101	94%	16	28	D
				TH	35	30		13		
				RT	5	5		13		
				Total	145	136				
			EB	LT	25	32		39		
				TH	180	157	90%	38		
				RT	345	308		38		
				Total	550	497				
				WB	LT	5	89%	15		
				TH	215	208		16		
				RT	45	24		13		
				Total	265	237				
				Int Total	960	870	91%			

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
48	Martin Luther King Jr Ave and Pecan St	Signal	NB	TH	1365	1155	85%	10	13	B
				RT	50	53		16		
				Total	1415	1208		29		
				LT	230	202	93%	11		
			SB	TH	380	365		39		
				Total	610	566		5		
				LT	70	78	103%	150		
			WB	RT	80	77		155		
				Total	150	155		13		
			Int	Total	2175	1929	89%	13		
46	Martin Luther King Jr Ave and Cypress St	Signal	NB	LT	10	8	84%	10	28	C
				TH	1320	1117		6		
				RT	260	209		7		
				Total	1590	1333		33		
			EB	LT	35	34	97%	24		
				TH	0	1		12		
				RT	75	72		302		
			SB	Total	110	107	95%	18		
				LT	150	125		9		
				TH	295	293		36		
			WB	RT	5	8	106%	32		
				Total	450	426		5		
				LT	70	73		130		
				TH	0	5		138		
				RT	60	61		2280		
				Total	130	138		28		
				Int Total	2280	2005	88%	28		
21	Martin Luther King Jr Ave and Lebaum St	TWSC	NB	LT	55	46	85%	4	63	F
				TH	1235	1052		6		
				Total	1290	1097		26		
				LT	15	15	100%	12		
			EB	RT	10	10		25		
				Total	25	25		2		
				TH	420	418		3		
			SB	RT	20	19	99%	52		
				Total	440	437		63		
				LT	15	13		15		
			WB	TH	15	13	79%	63		
				RT	340	266		50		
				Total	370	292		370		
				Int Total	2125	1852		63		
26	Martin Luther King Jr Ave and Malcolm X Ave	Signal	NB	LT	345	294	85%	37	38	D
				TH	1060	898		27		
				RT	15	14		36		
				Total	1420	1206		67		
			EB	LT	135	118	95%	61		
				TH	230	219		28		
				RT	155	156		85		
			SB	Total	520	493		70		
				LT	85	82		68		
				TH	240	249		35		
			WB	RT	120	112	79%	31		
				Total	445	442		31		
				LT	5	3		31		
				TH	505	401		31		
				RT	95	75		31		
				Total	605	479		38		
				Int Total	2990	2619	88%	38		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
27	Martin Luther King Jr Ave and Randle Pl	Signal	NEB	TH	1090	948	87%	107	94	F
				RT	0	2		100		
				Total	1090	950				
				LT	25	18		43		
				RT	225	175		44		
				Total	250	192				
			NB	LT	45	43	77%	21		
				TH	355	364		11		
				Total	400	407				
			SWB	LT	0	0	102%	381		
				TH	355	364		393		
				Total	400	407		412		
			WB	Hard LT	0	0	80%			
				LT	15	13		381		
				RT	105	83		393		
				Total	120	95		412		
			Int	Total	1860	1644	88%	94		
28	Martin Luther King Jr Ave and Alabama Ave	Signal	NB	LT	80	68	72%	267	72	E
				RT	165	109		460		
				Total	245	177				
			NEB	TH	925	840	91%	40		
				RT	65	60		2		
				Total	990	900				
			SWB	LT	50	331	100%	6		
				TH	345	64		36		
				Total	395	395				
			Int	Total	1630	1472	90%	72		
106	Martin Luther King Jr Ave and 4th St	OWSC	NB	LT	10	9	84%	225	235	F
				RT	450	378		235		
				Total	460	387				
			NEB	LT	540	524	97%	6		
				TH	10	9		5		
				Total	550	532				
			SWB	TH	110	108	94%	5		
				RT	315	292		0		
				Total	425	399				
			Int	Total	1435	1318	92%	235		
29	Alabama Ave and Randle Pl	Signal	NB	LT	0	0	94%	78	76	E
				TH	15	13		54		
				RT	5	6		43		
				Total	20	19				
			EB	LT	40	36	107%	32		
				TH	50	64		9		
				RT	25	24		12		
				Total	115	123				
			SB	LT	35	36	95%	98		
				TH	5	4		101		
				RT	5	3		178		
				Total	45	43				
			WB	LT	5	4	84%	60		
				TH	240	223		90		
				RT	195	143		99		
				Total	440	370				
			Int	Total	620	555	89%	76		
45	Alabama Ave and 7th St	Signal	EB	LT	15	15	118%	136	63	E
				TH	75	92		36		
				Total	90	106				
			SB	LT	310	286	91%	71		
				RT	25	20		73		
				Total	335	306				
			WB	TH	415	372	83%	46		
				RT	505	394		77		
				Total	920	766				
			Int	Total	1345	1178	88%	63		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
102	Alabama Ave and 8th St	OWSC	EB	LT	55	47	98%	13		
				TH	330	332		3		
				Total	385	379				
			SB	LT	5	4	88%	252		
				RT	35	31		245		
				Total	40	35				
			WB	TH	885	746	82%	11		
				RT	445	344		8		
				Total	1330	1090				
			Int	Total	1755	1504	86%	252		
30	Alabama Ave and Wheeler Rd	Signal	NB	LT	825	568		169		
				RT	45	33	69%	94		
				Total	870	601				
			EB	TH	215	213		10		
				RT	120	123		5		
				Total	335	337				
			WB	LT	15	17		42		
				TH	505	524	104%	47		
				Total	520	542				
			Int	Total	1725	1479	86%	86		
31	Alabama Ave and 11th Pl	Signal	NB	LT	20	19		32		
				RT	35	34	95%	8		
				Total	55	52				
			EB	LT	260	261		2		
				TH	10	9	100%	2		
				Total	270	270				
			WB	LT	10	13		7		
				TH	435	471	109%	4		
				Total	445	484				
			Int	Total	770	1078	140%	5		
105	Alabama Ave and 12th St	OWSC	NB	LT	5	5		15		
				RT	5	4	83%	7		
				Total	10	8				
			EB	TH	315	317		0		
				RT	15	14	100%	1		
				Total	330	331				
			WB	LT	10	10		2		
				TH	605	652	108%	2		
				Total	615	661				
			Int	Total	955	1000	105%	15		
32	Alabama Ave and 13th St	Signal	NB	LT	30	34		26		
				TH	15	16	107%	26		
				RT	65	68		7		
				Total	110	118				
			EB	LT	45	60		8		
				TH	260	246	100%	6		
				RT	15	15		4		
				Total	320	320				
			SB	LT	60	66		27		
				TH	10	11		20		
				RT	35	56		80		
				Total	105	133	126%			
			WB	LT	10	9		12		
				TH	550	565	103%	9		
				RT	50	52		7		
				Total	610	626				
			Int	Total	1145	1197	105%	13		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
210	Malcolm X Ave and 7th St	AWSC	NB	LT	305	236	80%	131	70	F
				TH	210	172		131		
				RT	5	7		126		
				Total	520	414				
			EB	LT	10	8	95%	39		
				TH	35	33		33		
				RT	285	271		30		
				Total	330	313				
			WB	LT	50	41	79%	40		
				TH	300	241		39		
				RT	150	112		35		
				Total	500	394				
			Int	Total	1350	1121	83%	70		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
48	Martin Luther King Jr Ave and Pecan St	Signal	NB	TH	315	288	98%	5	73	E
				RT	10	31		3		
				Total	325	319				
				LT	255	205	78%	72		
				TH	1015	786		132		
			SB	Total	1270	992	105%			
				LT	25	45		83		
				RT	350	350		2		
			WB	Total	375	395				
				Int Total	1970	1706	87%	73		
46	Martin Luther King Jr Ave and Cypress St	Signal	NB	LT	25	23	99%	57	128	F
				TH	235	245		16		
				RT	80	70		8		
				Total	340	337				
			EB	LT	0	1	90%	6		
				TH	20	17		15		
				RT	10	9		18		
			SB	Total	30	27				
				LT	200	145	77%	78		
				TH	835	652		100		
			WB	RT	5	4		78		
				Total	1040	800				
				LT	340	239	72%	356		
				TH	15	12		357		
				RT	90	72		249		
			Int	Total	445	322				
				Total	1855	1487	80%	128		
21	Martin Luther King Jr Ave and Lebaum St	TWSC	NB	LT	40	39	99%	22	89	F
				TH	310	308		2		
				Total	350	346				
				LT	5	6		36		
				EB	RT	10	10	50		
			SB	Total	15	16	106%			
				TH	1170	885		89		
				RT	15	11		57		
			WB	Total	1185	896				
				LT	5	5	93%	32		
				TH	5	4		16		
				RT	25	24		9		
				Total	35	33				
			Int	Total	1585	1291	81%	89		
26	Martin Luther King Jr Ave and Malcolm X Ave	Signal	NB	LT	305	279	99%	88	92	F
				TH	140	168		20		
				RT	55	47		29		
				Total	500	494				
			EB	LT	200	166	83%	160		
				TH	325	260		161		
				RT	365	313		108		
				Total	890	739				
			SB	LT	255	185	76%	148		
				TH	845	647		75		
				RT	85	64		81		
				Total	1185	896				
			WB	LT	25	25	98%	36		
				TH	250	243		34		
				RT	10	10		36		
				Total	285	279				
			Int	Total	2860	2408	84%	92		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations			
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS	
27	Martin Luther King Jr Ave and Randle Pl	Signal	NEB	TH	445	455	103%	144	50	D	
				RT	0	3		97			
				Total	445	457					
				LT	15	14	87%	44			
				RT	35	30		56			
				Total	50	44					
			SWB	LT	255	194		16	50		
				TH	980	792	80%	4			
				Total	1235	985					
			WB	Hard LT	0	1		53			
				LT	30	30	98%	47			
				RT	20	18		51			
				Total	50	49					
			Int	Total	1780	1535	86%	50			
28	Martin Luther King Jr Ave and Alabama Ave	Signal	NB	LT	30	26		40	17	B	
				RT	120	124	100%	81			
				Total	150	150					
			NEB	TH	325	344		17			
				RT	210	213	104%	1			
				Total	535	557					
			SWB	LT	175	165		15			
				TH	850	670	81%	9			
				Total	1025	835					
			Int	Total	1710	1541	90%	17			
106	Martin Luther King Jr Ave and 4th St	OWSC	NB	LT	15	14		16	16	C	
				RT	265	270	101%	14			
				Total	280	284					
			NEB	LT	270	289		2			
				TH	100	100	105%	2			
				Total	370	389					
			SWB	TH	410	328		6			
				RT	470	369	79%	0			
				Total	880	696					
			Int	Total	1530	1370	90%	16			
29	Alabama Ave and Randle Pl	Signal	NB	LT	10	10		44	23	C	
				TH	10	10		47			
				RT	10	8		40			
				Total	30	28					
			EB	LT	10	8		15			
				TH	365	359	97%	11			
				RT	10	8		13			
				Total	385	375					
			SB	LT	175	151		50			
				TH	20	12		47			
				RT	60	36		52			
				Total	255	198					
			WB	LT	5	4		26			
				TH	80	115		12			
				RT	30	26		17			
				Total	115	145					
			Int	Total	785	746	95%	23			
45	Alabama Ave and 7th St	Signal	EB	LT	25	39		24	25	C	
				TH	525	479	94%	26			
				Total	550	517					
			SB	LT	465	385		34			
				RT	20	17	83%	32			
				Total	485	402					
			WB	TH	95	129		10			
				RT	140	142	115%	11			
				Total	235	271					
			Int	Total	1270	1190	94%	25			

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
102	Alabama Ave and 8th St	OWSC	EB	LT	25	22	87%	36	208	F
				TH	965	839		33		
				Total	990	862				
			SB	LT	165	144	86%	208		
				RT	65	54		178		
				Total	230	197				
			WB	TH	170	217	115%	7		
				RT	210	218		3		
				Total	380	436				
			Int	Total	1600	1495	93%	208		
30	Alabama Ave and Wheeler Rd	Signal	NB	LT	180	191	106%	27	16	B
				RT	45	48		18		
				Total	225	239				
			EB	TH	625	550	87%	11		
				RT	505	431		12		
				Total	1130	982				
			WB	LT	185	194	114%	30		
				TH	200	245		14		
				Total	385	438				
			Int	Total	1740	1659	95%	16		
31	Alabama Ave and 11th Pl	Signal	NB	LT	25	24	98%	19	5	A
				RT	15	15		6		
				Total	40	39				
			EB	LT	535	493	92%	4		
				TH	40	34		5		
				Total	575	528				
			WB	LT	15	19	113%	8		
				TH	320	358		3		
				Total	335	377				
			Int	Total	950	1308	138%	5		
105	Alabama Ave and 12th St	OWSC	NB	LT	10	9	90%	3	6	A
				RT	25	22		6		
				Total	35	32				
			EB	TH	580	539	93%	1		
				RT	60	55				
				Total	640	594				
			WB	LT	50	48	110%	4		
				TH	365	408		1		
				Total	415	456				
			Int	Total	1090	1081	99%	6		
32	Alabama Ave and 13th St	Signal	NB	LT	50	52	103%	26	9	A
				TH	10	12		30		
				RT	45	43		8		
				Total	105	108				
			EB	LT	45	68	93%	4		
				TH	545	479		6		
				RT	15	13		4		
				Total	605	560				
			SB	LT	35	29	151%	40		
				TH	15	14		24		
				RT	10	48		13		
				Total	60	91				
			WB	LT	160	157	100%	13		
				TH	355	356		5		
				RT	50	52		5		
				Total	565	565				
			Int	Total	1335	1323	99%	9		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
210	Malcolm X Ave and 7th St	AWSC	NB	LT	150	144	109%	21	55	F
				TH	15	14		19		
				RT	0	23		18		
				Total	165	180				
			EB	LT	10	6	78%	82		
				TH	230	181		86		
				RT	395	306		82		
				Total	635	493				
			WB	LT	90	94	103%	24		
				TH	135	134		24		
				RT	10	13		22		
				Total	235	241				
			Int	Total	1035	914	88%	55		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
48	Martin Luther King Jr Ave and Pecan St	Signal	NB	TH	1165	1129	97%	13	16	B
				RT	60	58		22		
				Total	1225	1187				
				LT	290	290		29		
				TH	235	265	106%	7		
			SB	Total	525	555				
				LT	95	81		45		
				RT	355	357	97%	11		
				Total	450	438				
				Int Total	2200	2180	99%	16		
46	Martin Luther King Jr Ave and Cypress St	Signal	NB	LT	10	10	96%	11	10	A
				TH	1045	1008		5		
				RT	85	79		5		
				Total	1140	1097				
				LT	35	36		31		
			EB	TH	0	2	100%	25		
				RT	75	72		12		
				Total	110	110				
				LT	75	71		54		
				TH	250	267	105%	5		
21	Martin Luther King Jr Ave and Lebaum St	TWSC	SB	RT	5	7		3	30	D
				Total	330	346				
				LT	130	121		33		
				TH	0	8	98%	31		
				RT	145	141		10		
			WB	Total	275	270				
				Int Total	1855	1822	98%	10		
				LT	55	50				
				TH	920	875	95%	5		
				Total	975	925		4		
26	Martin Luther King Jr Ave and Malcolm X Ave	Signal	NB	LT	15	17	108%	26	41	D
				TH	10	10		15		
				Total	25	27				
				TH	435	441		5		
				RT	20	18	101%	8		
			EB	Total	455	459				
				LT	15	17		24		
				TH	15	15	101%	30		
				RT	205	205		19		
				Total	235	237				
			WB	Int Total	1690	1647	97%	30		
				LT	375	348				
				TH	830	789	94%	45		
				RT	15	11		20		
				Total	1220	1149		31		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations				
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS		
27	Martin Luther King Jr Ave and Randle Pl	Signal	NEB	TH	965	915	96%	92	75	E		
				RT	0	11		73				
				Total	965	926						
			NB	LT	25	25	93%	44				
				RT	150	139		45				
				Total	175	163						
			SWB	LT	45	48	102%	25				
				TH	360	364		17				
				Total	405	413						
			WB	Hard LT	0	3	95%	172				
				LT	15	15		180				
				RT	105	96		198				
				Total	120	114						
			Int	Total	1665	1616	97%	75				
28	Martin Luther King Jr Ave and Alabama Ave	Signal	NB	LT	80	80	103%	25	C	C		
				RT	75	80		85				
				Total	155	160						
			NEB	TH	890	859	96%	30				
				RT	65	61		2				
				Total	955	920						
			SWB	LT	50	358	101%	5				
				TH	350	46		28				
				Total	400	404						
			Int	Total	1510	1484	98%	25				
106	Martin Luther King Jr Ave and 4th St	OWSC	NB	LT	10	9	95%	125	F	F		
				RT	410	390		121				
				Total	420	399						
			NEB	LT	545	534	98%	5				
				TH	10	9		4				
				Total	555	543						
			SWB	TH	110	120	102%	6				
				RT	320	317		0				
				Total	430	437						
			Int	Total	1405	1379	98%	125				
29	Alabama Ave and Randle Pl	Signal	NB	LT	0	1	93%	14	B	B		
				TH	15	13		27				
				RT	5	5		44				
				Total	20	19						
			EB	LT	40	38	93%	15				
				TH	50	48		9				
				RT	25	22		10				
				Total	115	107						
			SB	LT	35	53	139%	35				
				TH	5	5		44				
				RT	5	5		57				
				Total	45	63						
			WB	LT	10	12	101%	5				
				TH	150	159		5				
				RT	120	113		11				
				Total	280	284						
			Int	Total	460	472	103%	14				

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations				
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS		
45	Alabama Ave and 7th St	Signal	EB	LT	15	18	118%	53	25	C		
				TH	75	88		20				
				Total	90	106						
			SB	LT	285	279	98%	31				
				RT	25	25		24				
				Total	310	304						
			WB	TH	255	258	100%	15				
				RT	410	408		28				
				Total	665	667						
			Int	Total	1065	1076	101%	25				
102	Alabama Ave and 8th St	OWSC	EB	LT	55	51	102%	6	11	B		
				TH	305	315		1				
				Total	360	366						
			SB	LT	0	0	86%	0				
				RT	10	9		11				
				Total	10	9						
			WB	TH	655	659	100%	2				
				RT	380	377		2				
				Total	1035	1036						
			Int	Total	1405	1411	100%	11				
30	Alabama Ave and Wheeler Rd	Signal	NB	LT	650	658	102%	31	23	C		
				RT	45	50		12				
				Total	695	708						
			EB	TH	215	217	103%	9				
				RT	90	98		7				
				Total	305	314						
			WB	LT	25	26	99%	28				
				TH	385	378		22				
				Total	410	404						
			Int	Total	1410	1427	101%	23				
31	Alabama Ave and 11th Pl	OWSC	NB	LT	20	18	96%	2	3	A		
				RT	35	35		2				
				Total	55	53						
			EB	LT	295	297	101%	1				
				TH	10	11		1				
				Total	305	308						
			WB	LT	15	16	96%	3				
				TH	370	353		0				
				Total	385	369						
			Int	Total	745	730	98%	3				
105	Alabama Ave and 12th St	Signal	NB	LT	40	39	96%	18	7	A		
				TH	25	25		20				
				RT	60	56		9				
				Total	125	120						
			EB	LT	95	92	101%	9				
				TH	225	230		5				
				RT	10	10		7				
				Total	330	332						
			SB	LT	5	4	99%	17				
				TH	0	0		2				
				RT	5	6		7				
				Total	10	10						
			WB	LT	15	16	98%	7				
				TH	340	324		5				
				RT	10	18		8				
				Total	365	358						
			Int	Total	830	820	99%	7				

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
32	Alabama Ave and 13th St	Signal	NB	LT	30	31	101%	24	22	C
				TH	260	261		23		
				RT	120	124		11		
				Total	410	416				
			EB	LT	130	134	100%	17		
				TH	140	139		8		
				RT	20	18		3		
				Total	290	290				
			SB	LT	175	208	105%	45		
				TH	10	8		16		
				RT	45	26		11		
				Total	230	242				
			WB	LT	55	56	104%	13		
				TH	290	304		15		
				RT	390	403		27		
				Total	735	762				
			Int	Total	1665	1709	103%	22		
210	Malcolm X Ave and 7th St	AWSC	NB	LT	270	271	100%	90	49	E
				TH	145	144		90		
				RT	10	13		79		
				Total	425	427				
			EB	LT	10	10	100%	28		
				TH	35	44		25		
				RT	260	252		20		
				Total	305	306				
			WB	LT	50	51	102%	26		
				TH	250	253		27		
				RT	80	83		23		
				Total	380	387				
			Int	Total	1110	1119	101%	49		
211	Malcolm X Ave and 8th St	AWSC	NB	LT	355	352	98%	27	24	C
				TH	75	70		25		
				RT	5	6		19		
				Total	435	428				
			EB	LT	15	20	125%	8		
				TH	25	32		10		
				RT	5	5		6		
				Total	45	56				
			SB	LT	0	1	105%	8		
				TH	5	4		8		
				RT	5	6		12		
				Total	10	11				
			WB	LT	0	0	151%	6		
				TH	20	29		13		
				RT	0	1		5		
				Total	20	30				
			Int	Total	465	526	113%	24		
212	Malcolm X Ave and Dogwood St	AWSC	NB	LT	20	29	100%	14	12	B
				TH	175	165		12		
				Total	195	195				
			EB	LT	5	30	132%	10		
				RT	25	9		17		
				Total	30	40				
			SB	TH	95	113	120%	12		
				RT	0	1		8		
				Total	95	114				
			Int	Total	320	348	109%	12		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
213	Dogwood St and 12th St	AWSWC	NB	LT	110	101	104%	9	11	B
				TH	0	6		11		
				RT	20	29		10		
				Total	130	135				
			EB	LT	20	15	102%	9		
				TH	95	105		12		
				RT	5	4		8		
				Total	120	123				
			SB	LT	10	9	92%	9		
				TH	5	3		9		
				RT	0	2		11		
				Total	15	14				
			WB	LT	0	3	109%	13		
				TH	85	93		12		
				RT	30	29		10		
				Total	115	125				
			Int	Total	380	396	104%	11		
126	13th St and Dogwood St	Signal	NB	LT	70	72	102%	18	23	C
				TH	655	661		16		
				RT	55	65		18		
				Total	780	798				
			EB	LT	35	30	114%	36		
				TH	15	45		36		
				RT	75	67		19		
				Total	125	142				
			SB	LT	40	37	103%	49		
				TH	85	92		29		
				RT	40	41		5		
				Total	165	170				
			WB	LT	70	72	122%	54		
				TH	5	12		57		
				RT	25	38		49		
				Total	100	122				
			Int	Total	1170	1232	105%	23		
201	Pecan St and Sycamore St	Signal	NB	LT	120	122	105%	39	14	B
				RT	0	4		24		
				Total	120	126				
			EB	TH	160	162	99%	4		
				RT	190	186		12		
				Total	350	348				
			WB	LT	0	30	109%	28		
				TH	330	331		9		
				Total	330	361				
			Int	Total	800	835	104%	14		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
205	Cypress St and Sycamore St	AWSC	NB	LT	105	109	104%	17	14	B
				TH	115	117		18		
				RT	35	39		16		
				Total	255	265				
			EB	LT	25	27	95%	11		
				TH	100	90		11		
				RT	35	35		10		
				Total	160	151				
			SB	LT	20	22	121%	14		
				TH	90	112		15		
				RT	10	11		11		
				Total	120	146				
			WB	LT	15	13	97%	12		
				TH	160	153		11		
				RT	45	47		10		
				Total	220	213				
			Int	Total	755	775	103%	14		
206	Cypress St and 13th St	AWSC	NB	LT	220	210	105%	14	13	B
				TH	340	375		13		
				Total	560	586				
				LT	30	29	97%	10		
			EB	RT	125	122		11		
				Total	155	151				
				TH	80	80	103%	11		
			SB	RT	0	3		12		
				Total	80	83				
				Int Total	795	819	103%	13		
			NB	LT	0	0	109%	16		
				TH	100	107		15		
				RT	80	89		13		
				Total	180	196				
			EB	LT	60	60	100%	11		
				TH	20	20		11		
				RT	10	10		10		
				Total	90	90				
			SB	LT	55	58	114%	14	13	B
				TH	85	102		15		
				RT	0	0		5		
				Total	140	160				
			WB	LT	0	2	105%	12		
				TH	10	10		13		
				RT	95	98		11		
				Total	105	110				
			Int Total	515	556	108%	13			

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations			
					Demand	Volume Served	% Served	Movement	Intersection		
								Delay (sec/veh)	Delay (sec/veh)	LOS	
48	Martin Luther King Jr Ave and Pecan St	Signal		NB	TH	265	279	101%	17	A	
					RT	100	89				
					Total	365	368				
				SB	LT	545	491	91%	15		
					TH	905	827				
					Total	1450	1318				
				WB	LT	30	23	82%	27		
					RT	435	357				
					Total	465	380				
				Int	Total	2280	2066	91%	10		
46	Martin Luther King Jr Ave and Cypress St	Signal		NB	LT	25	24	100%	13	A	
					TH	235	242				
					RT	100	97				
				EB	Total	360	362	90%	7		
					LT	0	3				
					TH	20	17				
				SB	RT	10	8	91%	12		
					Total	30	27				
					LT	300	269				
				WB	TH	630	577	94%	8		
					RT	5	5				
					Total	935	851				
				Int	LT	185	169	94%	33		
					TH	15	18				
					RT	130	125				
					Total	330	311				
					Int Total	1655	1551	94%	9		
21	Martin Luther King Jr Ave and Lebaum St	TWSC		NB	LT	40	35	99%	10	C	
					TH	330	333				
					Total	370	368				
				EB	LT	5	6	109%	16		
					RT	10	11				
					Total	15	16				
				SB	TH	810	742	91%	7		
					RT	15	12				
					Total	825	754				
				WB	LT	5	4	89%	11		
					TH	5	5				
					RT	25	23				
					Total	35	31				
				Int	Total	1245	1169	94%	16		
26	Martin Luther King Jr Ave and Malcolm X Ave	Signal		NB	LT	305	296	100%	50	D	
					TH	150	164				
					RT	55	51				
				EB	Total	510	511	93%	18		
					LT	210	192				
					TH	325	303				
					RT	380	354				
					Total	915	848				
				SB	LT	105	98	92%	25		
					TH	665	618				
					RT	55	41				
					Total	825	757				
				WB	LT	25	25	100%	44		
					TH	220	220				
					RT	10	10				
					Total	255	255				
				Int	Total	2505	2371	95%	43		

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations				
					Demand	Volume Served	% Served	Movement	Intersection			
								Delay (sec/veh)	Delay (sec/veh)	LOS		
27	Martin Luther King Jr Ave and Randle PI	Signal		NEB	TH	455	465	105%	13	B		
					RT	0	11					
					Total	455	476					
				NB	LT	15	14	85%				
					RT	35	29					
					Total	50	43					
				SWB	LT	205	185	93%				
					TH	865	812					
					Total	1070	997					
				WB	Hard LT	0	2	103%				
					LT	30	30					
					RT	20	19					
					Total	50	51					
					Int Total	1625	1567					
28	Martin Luther King Jr Ave and Alabama Ave	Signal	NB	NEB	LT	30	28	100%	6	A		
					RT	130	131					
					Total	160	159					
			SWB	NB	TH	325	345	105%				
					RT	210	219					
					Total	535	564					
			SWB	SWB	LT	125	116	94%				
					TH	785	740					
					Total	910	856					
					Int Total	1605	1579					
106	Martin Luther King Jr Ave and 4th St	OWSC	NB	NEB	LT	15	14	104%	18	C		
					RT	265	276					
					Total	280	290					
			SWB	NB	LT	270	288	106%				
					TH	100	103					
					Total	370	392					
			SWB	SWB	TH	370	349	94%				
					RT	445	418					
					Total	815	768					
					Int Total	1465	1449					
29	Alabama Ave and Randle Pl	Signal	NB	EB	LT	10	11	98%	21	C		
					TH	10	10					
					RT	10	8					
					Total	30	29					
			EB	SB	LT	10	5	100%				
					TH	315	319					
					RT	10	11					
					Total	335	335					
			SB	WB	LT	125	130	96%				
					TH	20	18					
					RT	60	49					
					Total	205	197					
			WB	WB	LT	5	5	106%				
					TH	90	99					
					RT	30	28					
					Total	125	133					
					Int Total	695	694					

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations				
					Demand	Volume Served	% Served	Movement	Intersection	LOS		
								Delay (sec/veh)	Delay (sec/veh)			
45	Alabama Ave and 7th St	Signal	EB	LT	25	35	101%	17	15	B		
				TH	425	420						
				Total	450	454						
				LT	365	337						
				RT	20	18	92%	5				
			SB	Total	385	354						
				TH	105	116						
				RT	65	63	105%	10				
				Total	170	178						
				Int Total	1005	987						
102	Alabama Ave and 8th St	OWSC	EB	LT	25	27	95%	10	27	D		
				TH	765	726						
				Total	790	752						
				LT	100	101						
				RT	65	65	100%	14				
			SB	Total	165	166						
				TH	105	113						
				RT	165	169	104%	1				
				Total	270	282						
				Int Total	1225	1200						
30	Alabama Ave and Wheeler Rd	Signal	NB	LT	100	106	105%	23	13	B		
				RT	45	45						
				Total	145	152						
				TH	460	447						
				RT	405	380	96%	11				
			EB	Total	865	826						
				LT	185	187						
				WB	TH	170	102%	18				
				Total	355	362						
				Int Total	1365	1340						
31	Alabama Ave and 11th Pl	OWSC	NB	LT	25	27	103%	10	10	A		
				RT	15	15						
				Total	40	41						
				LT	445	434						
				EB	TH	40	97%	1				
			WB	Total	485	472						
				LT	15	16						
				TH	450	453	101%	3				
				Total	465	469						
				Int Total	990	982						
105	Alabama Ave and 12th St	Signal	NB	LT	10	8	88%	11	7	A		
				TH	5	5						
				RT	25	23						
				Total	40	35						
			EB	LT	20	19						
				TH	380	379	98%	4				
				RT	60	51						
				Total	460	449						
				SB	TH	95						
			WB	RT	30	27	97%	14				
				Total	245	238						
				LT	120	117						
				TH	95	94						
				Total	480	490						
				Int Total	1225	1211	99%	7				

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations				
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS		
32	Alabama Ave and 13th St	Signal	NB	LT	15	14	103%	25	16	B		
				TH	115	119						
				RT	70	73						
				Total	200	205						
			EB	LT	45	50	99%	12				
				TH	420	411						
				RT	60	58						
				Total	525	519						
			SB	LT	265	256	99%	33				
				TH	220	214						
				RT	100	107						
				Total	585	577						
			WB	LT	160	158	101%	14				
				TH	365	367						
				RT	100	106						
				Total	625	631						
			Int	Total	1935	1932	100%	16				
210	Malcolm X Ave and 7th St	AWSC	NB	LT	75	65	108%	13	25	C		
				TH	15	13						
				RT	0	19						
				Total	90	97						
			EB	LT	10	9	93%	34				
				TH	180	173						
				RT	295	270						
				Total	485	452						
			WB	LT	90	87	102%	18				
				TH	180	188						
				RT	10	10						
				Total	280	285						
			Int	Total	855	834	98%	25				
211	Malcolm X Ave and 8th St	AWSC	NB	LT	170	173	103%	14	11	B		
				TH	20	22						
				RT	0	1						
				Total	190	196						
			EB	LT	60	57	107%	9				
				TH	40	48						
				RT	80	88						
				Total	180	193						
			SB	LT	0	1	92%	8				
				TH	85	78						
				RT	65	59						
				Total	150	138						
			WB	LT	0	1	124%	12				
				TH	45	52						
				RT	0	3						
				Total	45	56						
			Int	Total	565	582	103%	11				
212	Malcolm X Ave and Dogwood St	AWSC	NB	LT	40	50	113%	10	12	B		
				TH	30	29						
				Total	70	79						
			EB	LT	10	9	125%	9				
				RT	30	41						
				Total	40	50						
			SB	TH	150	171	114%	13				
				RT	5	6						
				Total	155	177						
			Int	Total	265	306	115%	12				

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations				
					Demand	Volume Served	% Served	Movement Delay (sec/veh)	Intersection Delay (sec/veh)	LOS		
213	Dogwood St and 12th St	AWSC	NB	LT	15	16	99%	9	14	B		
				TH	0	1		12				
				RT	15	13		8				
				Total	30	30						
			EB	LT	10	8	118%	14				
				TH	100	131		16				
				RT	70	74		15				
				Total	180	212						
			SB	LT	0	2	93%	11				
				TH	30	27		13				
				RT	40	36		9				
				Total	70	65						
126	13th St and Dogwood St	Signal	NB	LT	145	137	103%	16	20	B		
				TH	15	27		18				
				RT	5	5		15				
				Total	165	170						
			EB	Int Total	445	477	107%	14				
				LT	15	17		28				
				TH	150	151		13				
				RT	95	108		15				
			SB	Total	260	276						
				LT	15	13	127%	38				
				TH	15	50		37				
				RT	85	83		19				
			WB	Total	115	146						
				LT	10	12	96%	20				
				TH	440	421		17				
				RT	145	138		13				
			WB	Total	595	571						
				LT	60	63	147%	50				
				TH	5	15		50				
				RT	10	33		39				
			Int	Total	75	110						
				Total	1045	1104	106%	20				
201	Pecan St and Sycamore St	Signal	NB	LT	250	177	78%	33	19	B		
				RT	50	58		23				
				Total	300	235		5				
			EB	TH	460	416	90%	9				
				RT	185	163		41				
				Total	645	580		29				
			WB	LT	100	120						
				TH	215	203	102%	29				
				Total	315	322						
				Int Total	1260	1137						

Int #	Int Name	Traffic Control	Appr	Mvmt	Hourly Volume			Intersection Operations		
					Demand	Volume Served	% Served	Movement	Intersection	LOS
								Delay (sec/veh)	Delay (sec/veh)	
205	Cypress St and Sycamore St	AWSC	NB	LT	110	112	103%	18	26	D
				TH	35	37		20		
				RT	5	6		16		
				Total	150	155				
			EB	LT	110	104	91%	24		
				TH	215	193		18		
				RT	95	86		15		
				Total	420	383				
			SB	LT	70	59	95%	47		
				TH	110	121		51		
				RT	100	88		45		
				Total	280	267				
206	Cypress St and 13th St	AWSC	WB	LT	90	86	95%	19	18	C
				TH	120	112		12		
				RT	5	7		10		
				Total	215	205				
				Int Total	1065	1010	95%	26		
			NB	LT	95	92	104%	12		
				TH	235	252		10		
				Total	330	344				
				LT	15	15		12		
207	Sycamore St and 8th St	AWSC	EB	RT	275	243	89%	21	18	C
				Total	290	258				
				TH	455	431		20		
				RT	120	113		25		
				Total	575	544				
				Int Total	1195	1145	96%	18		
			SB	LT	0	2	95%	8		
				TH	25	23		11		
				RT	15	13		8		
				Total	40	38				
208	Sycamore St and 8th St	AWSC	WB	LT	40	39	103%	10	18	C
				TH	30	32		12		
				RT	10	11		10		
				Total	80	82				
				LT	75	68	99%	23		
				TH	80	98		26		
				RT	140	126		23		
				Total	295	293				
			SB	LT	65	67	105%	12		
				TH	10	9		13		
				RT	85	91		11		
				Total	160	168				
				Int Total	575	581	101%	18		